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June Sales Reach New Peak

271,000 Retail Deliveries; July Factory Schedules High

by Athel F. Denham
Detroit Editor, Automotive Industries

DETROIT—Domestic retail deliveries of new cars and trucks for the month of June exceeded all expectations, according to *Automotive Industries*' compilation of factory sales reports for that period. The total, aggregating 271,000 units, including 235,000 passenger cars and 36,000 trucks, represents the biggest month so far this year, exceeding even April slightly and the largest single month's business since May, 1931.

It clearly demonstrates the effect of price reductions during that month in not only stopping the downward sales trend which developed in May but actually raising it to a new high level and is the obvious answer to the unexpectedly high factory schedules set for the month of July.

Moreover, early scattered sales reports for the first week of July indicate that the sales level nationally has not yet shown any further downward trend of sizeable proportions. Production, which reached a temporarily low point last week with a number of major producers shut down for the holiday week for inventory purposes, was stepped back up to June levels the week ending July 14.

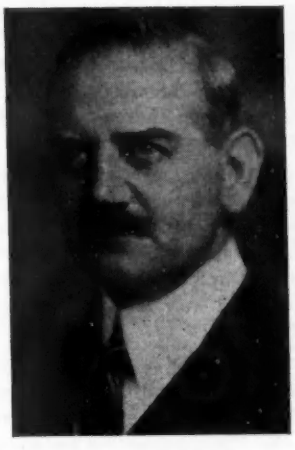
Individual company reports follow:

Buick sales in the last ten days of June reached the highest total since December, 1931, with 3,547 and a total for the month of 8,686 cars, the biggest June since 1931.

Sales of Dodge passenger cars continued a 5-week climb with a total of 2,419 for the week ending July 7. In that period 991 trucks were also delivered, representing increases of better than 15 per cent for both cars and trucks over the corresponding week in June.

Hudson reports factory shipments for the first six months of 65,810 Hudsons and Terraplanes compared with 23,000 in the first six months of last year.

Oldsmobile retail deliveries during June are reported as 91 per cent ahead of June of last year.



Alfred Reeves, NACC vice president, who announced organization's proposal to change its name. "National Automobile Manufacturers Association" is being considered and will be voted upon at next general membership meeting (See page 38)

Chrysler, De Soto Offer Overdrive at List Price

DETROIT—De Soto and Chrysler eight Airflow cars are now being offered with the overdrive at no additional cost. On both of these models the overdrive was formerly listed at extra cost. The overdrive, formerly described in these columns, is an auxiliary two speed gearbox back of the transmission which in effect reduces the effective engine to axle ratio at speeds above 45 miles per hour, thereby reducing engine speed, and resulting, it is claimed, in major economies along the lines of engine life, fuel and oil consumption.

Vehicle Code Not Subject To 15% Price Cut Order

WASHINGTON — The motor vehicle retail code is not subject to the President's recent order permitting bidders on government contracts to cut up to a maximum of 15 per cent under prices filed with code authorities. It is reliably reported that the NRA legal division has made this ruling and official confirmation is expected shortly.

Champion Gets Eagle

TOLEDO—According to M. C. Dewitt, vice-president of the Champion Spark Plug Co., the A.P.E.M. has awarded the Champion company the first blue eagle issued by the code authority for the Automotive Parts and Equipment Manufacturing Industry.

No Show Week or Hotel Exhibits; NACC Negotiates for N.Y.-Chicago Dealer Displays

DETROIT—The following statement was issued by the N.A.C.C. Tuesday, following a directors' meeting held in Detroit:

"At their meeting, the Executive Committee and Directors of the National Automobile Chamber of Commerce considered plans for the New York and Chicago dealers to conduct the 1935 shows in their respective cities, which would replace the national shows promoted for many years by the manufacturers.

"The executive committee of the Chamber having the show matters in charge, accepted certain of the dealer proposals and will prepare others, which, if accepted by the dealers, will result in the exhibition at New York and Chicago being managed and promoted by the retail merchants."

The question of the New York and Chicago shows, therefore, while approaching solution is not settled as yet. To review the history briefly, the execu-

(*Turn to page* 39, *please*)

Normal Registration Trend Reversed By June Price Cuts; 15% Gain Over May

PHILADELPHIA—Official confirmation of the stimulating effect of price reductions made in June by leading producers is provided by the first eight states to report registrations of new passenger cars in that month. Based on these partial returns, the normally downward seasonal trend was reversed last month and, as a result, when complete figures are available it is expected that they will show an increase over May of about 15 per cent.

The preliminary estimate for registrations reported in June is 250,000 against 219,163 in May and 174,190 in June last year. In the first six months, total registrations approximated 1,020,000, a gain of 50 per cent over last year's first half total of 682,367.

In the eight states for which reports are available, the returns indicate that the reductions tightened up competition among the "Big Three." Chevrolet and Plymouth both registered gains of 16 per cent over their May performance as compared with the Ford increase of 9 per cent in these states. The split-up of the market in May and June for this group of states is shown by the following table:

	Per Cent of Total	
	June, 1934	May, 1934
Chevrolet	30.7%	29.9%
Ford	27.2	28.3
Plymouth	16.9	16.5
All other makes	25.2	25.3
Total	100.0%	100.0%

The estimate of 250,000 new car registrations in June made herein differs materially from that on the preceding page which places June passenger car sales at 235,000. The latter estimate is based on reports received by factories from dealers and probably is a more accurate reflection of sales actually made in June than the estimate based on registrations. The discrepancy is due to the fact that registration reports tend to lag actual sales in the early months of the year. When this lag is made up subsequently, it naturally inflates the registration totals.

Study ALB's Relation To New Labor Board

Will Survey Regional Groups With View to Granting Added Powers

WASHINGTON—In a statement defining its present policy and activities the National Labor Relations Board said it must first determine to what extent the board and its agencies will attempt to act in a purely mediatory capacity in labor disputes not involving alleged violations of Section 7a. Details of cooperation and the extent of that cooperation with the conciliation staff of the Department of Labor also must be worked out.

The board also has announced that a series of studies will have to be made to determine its relation to such special boards as the Automobile Labor Board, the Steel Board and Longshoremen's Board, set up by the President to deal with particular situations. The National Board pointed out, that while these boards are temporary in character, nevertheless, close cooperation between them and the national body is desirable.

Under President Roosevelt's order creating the national body, the members are instructed to study the work of the 20 regional groups, reorganize them where necessary, and recommend to the President whether or not they should be vested with the powers authorized by Congress in the Joint Labor Resolution. These powers include the right to order and supervise elections by employees of their representatives for collective bargaining purposes. A conference will be held sometime during the coming week, it is expected, with the chairmen and executive secretaries of the regional groups in order to learn the ideas of the local boards and receive suggestions from them for the conduct of the work to be carried on.

The national body also has been instructed by the President to study the work of labor relation boards set up within certain industries by the various codes and to recommend whether or not additional or special powers should be granted.

Anderson Opens Office

DETROIT—George Porter Anderson, engineer, formerly associated with several large automotive concerns, has announced the opening of his office in the Detroit Savings Bank Building, as a consulting engineer. Formerly, Mr. Anderson was associated with the Western Electric Co.; Luxmore Co.; Packard Motor Car Co.; Graham Brothers Truck Co.; and Dodge Brothers and Chrysler Corp.

Chrysler Names Sage Chief Truck Engineer

DETROIT—Fred L. Sage, formerly truck engineer of the Studebaker Corp., has recently been appointed chief truck engineer in charge of all truck engineering activities for the Chrysler Corp., succeeding the late Benjamin F. Wright. A. G. Herreshoff, formerly in executive charge of the truck division is now assistant chief engineer of Chrysler Corp. in charge of chassis design.

E. P. Lamb has been promoted to assistant chief truck engineer in charge of drafting, releases and production contact work in connection with these activities. Other members of the truck engineering staff in the Chrysler Corp. include: F. A. Selje, in charge of new truck body design; F. A. Magoffin, production and vendor contact and special investigations; C. W. Kynoch, sales engineering contact (Dodge Plant); O. M. Raes, road test and experimental garage; E. G. Wettlauffer, in charge of production body drafting; W. E. Rigley, in charge of production chassis drafting; M. Van Meter, production contact chassis (Lynch Road Plant); A. Gorrels, production contact bodies (Lynch Road Plant).

Canadian Import Values

OTTAWA, ONT.—Imports of automobiles and parts and other vehicles of iron in May were value at $3,805,953, compared with $1,369,070 a year ago. There were 55 motor cars from the United Kingdom and 500 from the United States. Auto parts from the United States were valued at $3,339,000.

N.A.C.C. Places First Half Production At 1,802,442 Units; 75% Gain Over '33

NEW YORK—Motor vehicle production for the first half of 1934 was 1,802,442 units—an increase of 75 per cent over the corresponding period last year, according to a preliminary estimate released by the National Automobile Chamber of Commerce.

The Chamber estimated the industry's June output at 328,000 units which was a decrease of 7 per cent under the preceding month and an increase of 27 per cent over the same month a year ago.

The estimate which is based upon reports of factory shipments is summarized below:

June, 1934	328,000
May, 1934	351,802
June, 1933	257,613
6 Months 1934	1,802,442
6 Months 1933	1,031,839

Dealers Demand Factories Back Code

DETROIT—Copies of a petition addressed to F. W. A. Vesper, president of the National Automobile Dealers Association, demanding that he secure the support of the motor manufacturers for the new-car price maintenance and used-car allowance sections of the motor vehicle retailing code, have been sent to all state advisory committees by the Michigan Automotive Trade Association. The petition being broadcast nationally duplicates one that is already being circulated in Michigan for dealer signatures and is quite similar in content to one that is being circulated in Pennsylvania.

The Michigan dealers apparently aim to make their petition a test of each manufacturer's dealer policy as its concluding sentence indicates:

"Failure of any manufacturer of motor vehicles to cooperate with you in our attempt to maintain the Fair Trade Practice Provisions of Our Code will be considered by us as a yardstick of the merchandising principles and attitude of said manufacturer toward legitimate business and their dealers."

In a letter transmitting the petition to the state advisory committees, the M.A.T.A. says in part: "This association is not critical of the National Automobile Dealers Association but feels that this expression of sentiment on the part of the dealers of the several states, if presented to President F. W. A. Vesper of the N.A.D.A., would enable him to better express to the chief executives of the motor vehicle factories of this country the Code sentiment nationally of the retailers of their products. . . . We assume that your dealers are of the same opinion as the dealers of Michigan and that a matter of 48 to 72 hours will be sufficient for you to obtain the signatures of all your dealers and return these petitions to this office."

That a move in this direction was under way was revealed in *Automotive Industries* of June 30, 1934, when it was stated in part: "Whether a satisfactory degree of compliance with the used car allowance and new car price maintenance provisions of the motor vehicle retailing code can be attained, a steadily increasing number of dealers are concluding, hinges entirely on how far motor car makers will go in cooperating with dealer administrative agencies in enforcement.

"As a direct consequence of this trend of dealer opinion, action already is being taken in a number of important states looking toward the presentation of petitions to factory executives asking them to go on record to the effect that they are in favor of the code as a beneficial influence in the industry and that they expect their field men and dealer organizations to cooperate in its observance."

The immediate function of the petitions, of course, is to provide Mr. Vesper with concrete evidence that the demand for factory cooperation has the united backing of the nation's dealers. And what the dealers really mean by cooperation is that the factories will cancel recalcitrant dealers who cannot be pushed into line in any other way.

Adoption of any such policy would be fraught with obvious legal perils for the manufacturers and it is doubtful that they will share the confidence dealers seem to hold that such perils can be circumvented by subterfuge. Moreover, the individual manufacturer who might be disposed to a chiseling dealer will be faced with the possibility that one of his competitors will immediately grab him. In addition, with the N.I.R.A. coming up for renewal in the next Congress, there is at least some doubt that the factories would want to be on record as endorsing the dealer code since such endorsement might rise to plague them next year in connection with any position they might take on the continuation or modification of the Recovery Act.

The Michigan petition, which has gone to all state advisory committees reads as follows:

Mr. F. W. A. Vesper, President,
National Automobile Dealers Assn.,
St. Louis, Mo.
Sir:

We, the undersigned automobile dealers, holding contracts with motor vehicle manufacturers and operating under the Motor Vehicle Retailing Code in the State of MICHIGAN do hereby respectfully demand that you, as President of the National Automobile Dealers Association, submit to the President of each motor vehicle manufacturing unit in the United States, the following petition, with authority on our

(Turn to page 36, please)

Average List Price of New Cars $715 in May

PHILADELPHIA—The average retail list price of new passenger cars registered in the United States in May was $715, *Automotive Industries* estimates, as compared with $724 in April and with $656 in May last year. For all new cars registered in the first five months of the year, the average list price was $710 against a $672 average for the similar period in 1933.

Biologist famed for breeding new varieties of flies turns his talents to streamlining. Dr. Calvin B. Bridges shown with a model of his new car, standing alongside the car now under construction. The car will seat four, has four independently sprung wheels, completely encased, and will be propelled by motor cycle engine. The vehicle is to weigh 700 pounds and will having a cruising speed of 60 m.p.h. with a top speed of 100 m.p.h.

Code Price Provisos Satisfy Parts Makers

Little Interest Aroused by FDR's Order Allowing 15% Cut to Government

DETROIT—Parts manufacturers on the whole appear highly satisfied with the price provisions being incorporated in the supplementary product groups of the A.P.E.M. While the heater code actually carried a provision against selling below representative cost, and one or two other supplementary codes filed early may also carry this provision, other codes will contain the phrasing issued in NRA bulletin No. 228. According to this bulleting excessive or unreasonable price cutting is banned under the fair trade practice provisions. Accounting systems to be developed for each product group are to be used in determining costs, and an emergency can still be declared by the code authority or NRA in each group if excessive price cutting is found to exist. In such a case representative costs would be established below which manufacturers would not be permitted to sell during the emergency.

A point not yet settled is the length of the waiting period which must elapse before reduced prices, filed with the code authority, become effective. That most responsible parts manufacturers desire such a waiting period goes without question, since the object is to protect the smaller manufacturer even more than the big one against unexpected reductions in prices by competitors. The 48-hour waiting period before price increases can become effective (after filing) would hardly seem to be enough to cover the question of protection under price reductions.

Parts manufacturers in this area express little interest in the Presidential order permitting reductions up to 15 per cent below filed prices on sales to governmental agencies, since parts manufacturers have little dealings directly with such agencies. Any reductions in bids by motor vehicle manufacturers is not expected to affect parts producers.

Packard Re-vamps Plant and Personnel for New Car

DETROIT—With a complete realignment and renovation of its plant well under way, Packard has started major readjustments of its organization. In addition to the expansion in engineering personnel previously reported, reorganization of factory sales personnel is now under way.

R. E. Chamberlain, former general sales manager and for the last few years Packard distributor in Buffalo, is being called back to the factory to become sales manager of the present Packard division. A sales manager for the smaller car is to be appointed later.

F. H. McKinney, who added sales activities to his advertising duties when J. W. Loranger resigned as sales manager last year, has been made director of advertising and sales promotion for both the new car and Packard lines. A sales promotion manager is to be appointed for the new car.

Appointments of several men in the manufacturing division will be made shortly. E. F. Roberts, vice-president of manufacturing, will be in charge of production of both lines.

The Packard factory is being revamped into two separate plants in one of which the manufacture of Packard cars will be carried on, while in the other the new and smaller car will be built. No increase in factory space will be required as a result, although major purchases of machine tools and production equipment for the new car will be made.

Elijah G. Poxson, named president of newly formed Reo Sales Co. and (right) C. A. Triphagen, who succeeds Mr. Poxson as sales manager of Reo

No Recent Steel Price Revisions

Report Some Mills Ready for Abridged Summer Work Program

NEW YORK—Market gossip has it that those mills which took the initiative in revising steel prices downward were rewarded by quite a little business from automotive consumers. On the whole, however, the steel market is marking time. After all, what were proclaimed as sweeping price reductions, are on the average mark-ups of $3 per ton over what buyers had to pay for their second quarter purchases. Having stocked steel for their nearby requirements, most consumers are disposed to await further developments, thus making it quite probable that July and August will be months in which most steel will be bought as needed.

According to the American Iron and Steel Institute's figures, the steel mills are operating this week at 27½ per cent of ingot capacity, compared with 23 per cent last week. Finishing mills are having slightly better, but decidedly light runs. While steel sellers are eagerly scanning the horizon for the first signs of a recurring buying appetite, they have been prepared for weeks for the dullness that has set in. In some cases a program of abridged working time for July had been prepared in advance.

Up to Monday no price revisions had been filed with the Code Authority for wire and wire products, this description of steel being one of the few exceptions from the general rule. Alloy steel bars, both hot rolled and cold finished, have been reduced $2 a ton from the previously listed prices, effective on Friday of this week.

Into a long range view of the market outlook enter two factors that are coming more and more to the front. Like the weather forecasters, who are bound to hit it off right some time, those who have been saying right along that demand for structural steel, resulting from the aid given to the building industry by the Government, would prove a paramount influence in the steel market are likely to have their predictions come true in part before very long. Primary steel prices are certain to benefit from broader demand for building material, and this will affect the tone of the steel market generally. On the other hand, news item after news item report increases in rolling capacity and improvements and economies in rolling methods. With the cost of conversion of primary into finished flat steels the chief item in the steel bill of automotive consumers, these developments are of vital importance to them.

See Dealer Stocks Controlling Prices

Growing Tendency Toward Clearing Inventories by Declaring Cars Obsolete

DETROIT—List prices of new automobiles may soon depend to some extent on the condition of dealer stocks and local competitive situations, if tendencies now in evidence continue to spread. Today some eight or ten different chassis models of different companies are selling at discounts, the mark-downs in some cases varying not only in different states but in different localities in the same state.

With the code providing a legal prohibition on used car appraisals in excess of the book values, the time-honored trading allowances which factories have granted dealers in the past to stimulate the movement of inventories, are out. Consequently manufacturers must adopt one of two alternatives to clear inventories.

List prices may be cut which quite commonly involves some rebate to the dealer on cars he has in stock. Or list prices may be maintained nominally with discounts offered on cars that have or are about to become "obsolete."

While the dealer code specifically forbids offering discounts on current models, there is a loophole which permits dealers to offer new cars of obsolete design at reduced prices with the sanction of their state advisory committees and the factory concerned. The only requirement therefore is for the manufacturer to state that beginning with such and such a serial number, all cars are new models. Earlier production is thus obsoleted and with the O. K. of the state advisory committees, the obsolete new cars may be offered at a discount. In some cases, such designation of "new" models has been justified by minor modifications in appearance or by adding items of chassis equipment formerly sold at extra cost.

Cooperation of the dealer code authority in authorizing such reductions apparently has been readily obtainable so far. When such authority is received the manufacturer notifies his dealers that they are permitted to apply to their state code authority for permission to cut prices. It is up to the dealers to specify the amount of discount they wish to allow customers in order to move such "obsolete" cars. Obviously wide divergencies have been found (and granted) in such cases. Naturally also this condition has led to confusion even among dealers handling the same make of car in adjacent communities.

No factory statements have been obtainable as to whether dealers are being rebated such discounts or portions thereof, but in some cases it is known that the dealer is carrying the whole burden.

In two or three cases on the other hand factories have made actual reductions in list prices nationally effective, rebating the dealers accordingly. These cases apply to companies who apparently plan to introduce or have introduced "new models" involving material changes in design.

The reaction of state code authorities to what appeared to be an epidemic of disorganized price reduction requests has differed nationally. In some states requests have been granted without major investigation. In others dealers have been required to file serial numbers of cars to be sold at discounts before such discounts were granted, as a check against selling later production models of the same appearance and general design at unauthorized discounts.

While the above situation is limited rather than general in extent, some indication exists that if it is extended materially by the industry that the dealer code authority may decide to require more definite proof of obsolescense and may limit maximum discounts allowable on new cars under such "clean-ups."

Already some rather ludicrous situations have developed as exemplified by one series of cars on which a certain chassis unit was formerly offered at around $35 extra cost. The new model, which has rendered former production obsolete, carries this item as standard equipment, in effect representing therefore a $35 reduction in list prices. Former production cars, now "obsolete," however, are being offered by some dealers at around $125 or more discount from the former list—nearly three times the difference in actual former list prices, with or without that chassis unit.

Edmund K. Swigart

MILWAUKEE — Edmund Kearsley Swigart, chairman of the board of the Oilgear Co. and senior vice-president of the Bucyrus-Erie Co., Milwaukee, died of heart disease July 7 while spending a few days fishing in the Wisconsin north woods country. He was 67 years of age.

Retail Motor Code Budget $2,394,666

Figures Predicated on New and Used Car Basis; Set $4 Per Capita Tax

WASHINGTON — A budget totaling $2,394,666 for administering the motor vehicle retail code during the 12-month period which began July 1, 1934, has been submitted to NRA and public hearing on the proposal will be held here July 25.

The budget total represents the aggregate of the totals submitted by the various states which amounts to $2,264,766 and $129,900 for the National Control Committee for national administration. The latter total is to be raised by a per capita levy of $4 on each new and exclusive used car dealer in the United States of which there are estimated to be 39,505.

The estimated budgets submitted by the different states ranges from a low of $5,495 for Arizona up to a high of $189,247 in Pennsylvania. Next to the Keystone State is California which estimates administrative expenses for the northern and southern divisions together at $156,658. New York, including the metropolitan New York City area, is third with an estimate of $136,264. The Michigan estimate is $125,260, while Illinois and Ohio are both over the $100,000 mark.

The various budgets do not bear any very close relation to the extent of the markets offered by the different states. It is to be expected that the administrative expense per car sold will be largest in states in which the number of new cars sold is relatively small and the budgets bear this assumption out. However, when the budgets are reduced to a per cost of new car registered in 1933, some rather large differences appear. For example, on this basis, the estimated cost of administration is 78 cents per car in New York while in the adjacent state of Pennsylvania the cost is $1.55. In California, the cost is $1.60, while in Texas it is $1.11. West Virginia has the highest cost per car, $4.00, while New York has the lowest.

Replacement Axle Shaft Supplementary Code OK'd

WASHINGTON — Approval of the supplementary code of fair competition for the Replacement Axle Shaft group of the parts and equipment industry has been announced by General Johnson. The order of approval stipulates that the provisions of the code prescribing a waiting period between the time of filing with the Code Authority and the effective date of revised price lists or revised terms and conditions of sale, are stayed pending further order.

MEMA Monthly Index

(January, 1925, equals 100)	May, 1934	April, 1934	May, 1933
Original equipment shipments to vehicle manufacturers	112	130	64
Service parts shipments to wholesalers	143	145	118
Accessories shipments to wholesalers	83	72	56
Service equipment shipments to wholesalers	86	71	50
GRAND INDEX (composite) of above divisions	115	127	71

Business in Brief

Written by the Guaranty Trust Co., New York, exclusively for Automotive Industries

The tendency for general business to improve that has been noticeable for some time in the past continued last week. Retail trade in summer goods was stimulated by the extremely warm weather, but activity in the wholesale branches of trade was retarded.

Freight Increased

Railway freight loadings during the week ended June 30 totaled 644,572 cars, which marks an increase of 22,700 cars above those during the preceding week, an increase of 2842 cars above those a year ago, and an increase of 256,291 cars above those two years ago.

According to estimates compiled by the 13 Shippers' Regional Advisory Boards freight car loadings during the third quarter of this year will be about 4.5 per cent above actual loadings during the corresponding period last year.

More Current Used

Production of electricity by the electric light and power industry of the United States during the week ended June 30 was 2.0 per cent above that in the corresponding period last year. This marks the lowest increase above a similar period a year ago since the week ended May 13, 1933.

Oil Output Skyrockets

Average daily crude oil production for the week ended June 30 amounted to 2,592,000 barrels, which was 61,700 barrels above the Federal allowable figure, and compares with 2,506,000 barrels for the preceding week and 2,602,050 barrels for the corresponding period last year.

Mined Bituminous Up

Production of bituminous coal during the week ended June 23 amounted to 6,160,000 tons, which marks an increase of 48,000 tons above that during the preceding week, and compares with 5,990,000 tons during the corresponding period last year.

Fisher's Index

Professor Fisher's index of wholesale commodity prices for the week ended July 7 stood at 77.8, as compared with 78.0 for both the week and two weeks before.

Federal Reserve Statement

The consolidated statement of the Federal Reserve banks for the week ended July 3 showed increases of $2,000,000 in holdings of discounted bills and of $2,000,000 in holdings of government securities. Holdings of bills bought in the open market remained unchanged. The reserve ratio on June 3 was 69.2 per cent, as against 69.6 per cent the week before and 69.7 per cent two weeks before.

Dealers Demand Factories Back Code

(*Continued from page* 33)

behalf to negotiate any agreement or understanding necessary to carry into full force and effect the demand and suggestion herein contained.

Seven months' experience operating under the Code of Fair Competition for the Motor Vehicle Retailing Trade has resulted in definite and substantial benefits to the entire automobile retailing trade, and the provisions of this Code have met with wide acceptance by the consuming public.

We feel it is essential to the entire automobile industry that the Fair Trade Practice Section of this Code be continued, and that the manufacturers cooperate in the enforcement of these provisions of the Code. Without the unqualified backing and support of manufacturers, there will be a return to the former selling methods which will eventually break down and destroy the organization which supplies the outlets for motor vehicle factory products. Regardless of whether or not our Code is maintained and enforced as the dealers of the United States in its inception believed it would be, the Wages, Labor and Hour provisions of the Code will remain in full force and effect until July 1, 1935. This situation would impose an intolerable burden upon dealers and would eventually bankrupt the great majority of the organizations.

We, therefore, respectfully demand that you secure the wholehearted, individual and collective support of the Motor Vehicle Retailing Code by the motor manufacturers of the United States to those portions of the Fair Trade Practice Provisions of our Code governing the price of new merchandise and allowances on used motor vehicles taken in trade.

Failure of any manufacturer of motor vehicles to cooperate with you in our attempt to maintain the Fair Trade Practice Provisions of our Code will be considered by us as a yardstick of the merchandising principles and attitude of said manufacturer toward legitimate business and their dealers.

The following petition is being circulated in Pennsylvania:

To Motor Vehicle Manufacturers:

Believing that the Motor Vehicle Retail Trade Code of Fair Competition has widespread public acceptance, and that it has been, and can be of tremendous benefit, both to automobile dealers and to automobile manufacturers, and believing that the cooperation of the manufacturers would be of material assistance to us in our effects to administer our Code, we, the following dealers, residing in the State of PENNSYLVANIA request that the President of each motor vehicle manufacturing company issue a public statement, for distribution to his own field and dealer organization, and in addition thereto, to the trade generally, to the effect that he believes the Code is mutually beneficial to both dealer and manufacturer, and that he is desirous that his dealers live up to the letter and spirit of its provisions.

Exide Launches Sales, Merchandising Campaign

PHILADELPHIA — A battery sales and merchandising program is now being presented to the automotive trade by The Electric Storage Battery Company, makers of Exide Batteries. Meetings are scheduled in 300 cities throughout the country, where the new program will be presented by Exide sales representatives. A film production with sound, showing the plan in actual practice at Exide service stations, is a feature of the event.

Chrysler Body Draftsman Reference Work Author

DETROIT—Elkanah H. Brill, a body draftsman with the Chrysler Corp., is the author of "Body Drafting and Sheet Metal Stamping," the first work of its kind to be published. The book, plentifully illustrated, is intended to serve as a text and reference volume. Written in two sections, the first deals with theory and the second part with practical application.

Hayes Body Corp.

GRAND RAPIDS—The Hayes Body Corp. is reported to have offset the loss sustained in the first quarter of this year through profits made during the second quarter, consequently giving them an even break on the first six months of 1934. There was a definite slackening of production in refrigerator parts, manufacture of which forms an important portion of the company's business.

GM's June Sales Highest Since '31

First Half Sales Ahead of '33 by 165,000 Units; New Car Inventories Up

NEW YORK—Retail sales of the General Motors Corp. reached the highest level in June since May, 1931, with a total of 112,847 units. This compares with 95,253 in May, 1934, and 101,827 in June last year. In the first half of the year domestic retail sales aggregated 494,972, an increase of 24 per cent over the 399,764 units delivered in the same period in 1933.

June sales to U. S. dealers amounted to 118,789 against 103,844 in May and 99,956 in June, 1933. The first half total of sales to dealers was 592,867, which compares with 427,762 in the corresponding period last year.

New car inventories of General Motors dealers in this country increased 5942 units in June marking the sixth successive month that the corporation's field stocks have maintained an upward trend. For the year to June 30, the increase in dealer stocks amounts to 97,895 units.

Total sales to dealers in the United States and Canada plus overseas shipments numbered 146,881 in June representing a gain over both May, 1934, and June, 1933, in which the respective totals were 132,837 and 113,701. Total sales for the first six months were 750,276 as contrasted with 498,622 in the first half of last year.

Sales outside of the United States in June numbered 28,092 against 13,745 units a year ago. The six months' total of such business was 157,409 which was more than double 1933 volume for the same period, which amounted to 70,860.

The following table gives the percentage increases registered by sales in the different classifications:

	June, 1934, over May, 1934	June, 1934, over June, 1933	6 Mos., 1934, over 6 Mos., 1933
	%	%	%
Sales to U. S. Consumers	+18	+11	+24
Sales to U. S. Dealers	+14	+18	+38
Total Sales—U. S., Canada and Overseas Shipments	+11	+29	+50

Caravan of 85 Trucks Largest '34 Drive-Away

DETROIT—The largest drive-away of Detroit-made motor trucks to leave the city this year departed a few days ago when a caravan of 85 Dodge trucks of various types and sizes left the Dodge truck factory bound for Chicago.

The trucks were piloted by a group of truck salesmen and dealers from the Chicago region who had attended a two-day sales session at the factory.

Ford's Volume for June Near Record

World Total Is Largest Since 1930; First Half Registers 119% Increase

DEARBORN—World sales of Ford passenger cars and commercial units in June totaled 101,661, the largest June sales volume since 1930, according to an announcement by Ford Motor Company. This compares with 58,543 in June, 1933.

Total Ford world sales for the first six months of 1934 were 489,915 which was 119 per cent increase over the 1933 total for the same period, which was 223,727.

Ford's June production in its plants throughout the world was 98,445 as compared with 61,912 a year ago in June.

Ford's world production total passed the half-million mark in June, the total for the first six months of the year being 536,637 Ford passenger cars and commercial units. This compares with 228,117 units in the same period last year.

New Continental Official

DETROIT—L. N. Rosenbaum has been elected chairman of the finance committee and a member of the board of directors of the Continental Motors Corp.

May Exports Treble Last Year's Totals

	May				Five Months Ended May			
	1934		1933		1934		1933	
	Number	Value	Number	Value	Number	Value	Number	Value
Automobiles, parts and accessories.....	....	$20,615,769	....	$7,371,951	....	$86,730,789	....	$27,181,376
Motor trucks, buses and chassis (total).....	8,612	4,072,725	2,656	1,239,867	43,056	19,585,807	11,404	4,798,378
Under one ton	589	204,642	443	125,615	4,304	1,331,599	1,247	325,017
One and up to 1½ tons.....	6,863	2,799,624	1,852	723,694	33,474	13,514,456	8,917	3,226,105
Over 1½ tons to 2½ tons.....	921	739,225	271	203,512	4,283	3,359,874	956	755,026
Over 2½ tons	197	307,172	83	182,501	839	1,297,055	218	421,914
PASSENGER CARS								
Passenger cars and chassis.....	16,058	8,935,460	5,662	2,707,581	61,265	33,511,069	23,770	11,302,274
Low price range $850 inclusive.....	14,751	7,435,020	5,279	2,277,716	56,446	28,051,497	22,107	9,350,478
Medium price range over $850 to $1,200.....	793	766,632	234	218,096	3,018	2,904,966	962	926,434
$1,200 to $2,000	286	429,738	101	143,994	981	1,536,629	473	716,831
Over $2,000	92	250,354	19	56,975	316	830,520	104	....
PARTS, etc.								
Parts except engines and tires.....	....	....	....	....	....	....	....	....
Automobile unit assemblies.....	....	4,801,352	....	2,151,013	....	20,402,977	....	5,801,064
Automobile parts for replacement (n.e.s.)...	....	1,711,097	....	818,832	....	8,903,619	....	3,370,937
Automobile accessories (n.e.s.).....	....	256,346	....	99,094	....	1,166,545	....	391,235
Automobile service appliances	....	237,108	....	63,385	....	1,013,126	....	253,663
Airplanes, seaplanes and other aircraft.....	33	550,600	22	263,518	123	2,032,028	148	1,902,028
Parts of airplanes, except engines and tires..	....	180,287	....	123,385	....	1,186,100	....	527,259
INTERNAL COMBUSTION ENGINES								
Stationary and Portable:								
Diesel and semi-Diesel.....	5	6,936	2	3,713	48	109,346	6	21,719
Other stationary and portable:								
Not over 10 hp.	428	26,086	205	17,896	1,802	126,433	787	55,015
Over 10 hp.	94	48,339	69	35,937	449	286,340	214	99,977
Automobile engines for:								
Motor trucks and buses	794	99,065	47	9,817	2,286	281,962	487	77,074
Passenger cars	3,313	206,164	2,361	127,344	15,352	944,507	6,911	449,424
Aircraft	29	106,881	14	56,870	412	1,853,903	651	444,346
Accessories and parts (carburetors).....	....	120,934	....	79,476	....	530,595	....	311,407
IMPORTS								
Automobile and chassis (dutiable).....	42	9,397	36	6,982	194	67,123	132	55,386
Other vehicles and parts for them (dutiable	....	9,898	....	8,956	....	35,329	....	25,099

NACC Considers Change In Name

Proposal To Include "Manufacturers" Will Be Made To Members

NEW YORK—At the meeting of the N.A.C.C. board of directors held this week in Detroit it was decided to recommend a change in name for the organization at the next general membership meeting. The present suggested new name is "National Automobile Manufacturers Association." Two factors are particularly responsible for the suggestion of a change in name. They are:

1. Desire to distinguish the group from other automotive industrial groups such as parts and equipment manufacturers, dealers, and jobbers associations.

2. Desirability of including the designation "Manufacturers" in the name, particularly in connection with the organization's work in foreign countries in assisting export trade.

No change in the policies or by-laws which have been maintained by the Chamber during the quarter of a century that it has functioned as the trade association representing the automobile manufacturers of the United States, is being contemplated, Alfred Reeves, vice-president and general manager, stated.

Some members of the organization, he explained, consider the present name not sufficiently descriptive and consequently confusing to the public who sometimes are misled to believe that it is an organization representing automobile dealers, automobile owners, or the automobile parts, tire or fuel trades and industries.

The Chamber was organized 21 years ago as the result of a merger of the two parent organizations.

The National Automobile Chamber of Commerce was formed at the time the Selden patent suit was terminated in 1911, when the former Association of Licensed Automobile Manufacturers (licensed under the Selden patent) was reorganized as the Automobile Chamber of Commerce. At the time no new members were taken in and those manufacturers who had not had a Selden license therefore were not members of the Chamber. Practically all automobile manufacturers, however, belonged to the National Association of Automobile Manufacturers, which had preceded the Association of Licensed Automobile Manufacturers by several years and which had conducted the national automobile show in Chicago continuously, and also some shows in New York. Two years later the National Association of Automobile Manufacturers was merged with the Automobile Chamber of Commerce and at the same time the name was changed to National Automobile Chamber of Commerce.

Under the management of Mr. Reeves the N.A.C.C. has looked after the interests of the automobile industry ever since. In addition to conducting annual national shows it has been responsible for the patent pool in the industry; it operates a service division with the object of improving automobile service generally; for many years it published each year a Handbook of Gasoline Automobiles, a sort of joint catalogue of the products of its members, and it still continues to publish its annual "Facts and Figures of the Automobile Industry," which has become the prototype for similar publications in several foreign countries.

Johnson Creates "Basic" Code for Small Industry

WASHINGTON — To expedite code making and clean up pending codes so that NRA may concentrate on administration, General Johnson has issued an order inviting small industrial groups not yet codified to merge with existing kindred codes or to operate under a new "basic" code.

The new basic code provides, if desired, a simple plan of open price reporting in line with NRA's new policy on prices and authorization for other fair trade practices as well as provisions for labor, wages, hours, collective bargaining rights, child labor bans, standard rules covering working conditions including safety factors and health conditions.

The only major automotive group not yet codified is the maintenance group, and since this has been declared a service trade, the order does not apply to it.

General Johnson's order fixes a 30-day period, from July 12, for completion of all code making and covers 262 codes now waiting approval. If any industrial groups remain outside a kindred code, or the "basic" code, at the end of the 30-day period and appear to be harboring labor abuses, a hearing is to be held to determine whether a labor code shall be imposed.

Seek PWA Funds to Carry On Scientific Research

WASHINGTON—According to a report made public by John Dickinson, acting Secretary of Commerce, the Committee on the National Bureau of Standards of the Business and Advisory and Planning Council urges an increased appropriation out of PWA funds to carry on the scientific research work of the bureau.

Eight projects have been referred to the PWA, involving a grant of $698,000. Two of these are directly important to the automotive industry—dynamometer for testing motor vehicles, $60,000, and a one year program to cost $20,200, on the effect of oil filters in reducing wear of automotive equipment. Favorable action on the report was taken at the last meeting of the Planning and Advisory Council.

Johnson Recommends Board to Rule NRA

Opposes Proposed Plan for Business Councils to Govern Industries

WASHINGTON—Administrator Hugh S. Johnson is strongly opposed to suggestions that code authorities set up a business council to run industries of the country unless protection be given the public through government representatives having veto power.

The General made this known at his press conference last Tuesday when he was on the eve of the trip across the country he is beginning in another effort to re-sell NRA. Whatever new form NRA may take, or whether it is continued after June 16, 1935, when the Recovery Act expires, by legislative action, the General insists that the government must have some authority if business attempts to take over the principles of the organization, modified or otherwise, and puts them into effect.

The General also thinks NRA has become more than a one-man job and has told President Roosevelt as much. He stated that he has recommended to the President that the NRA be reorganized under a commission form of administration. The General said if he could he would like to avoid being a member of the commission. But, he added, if the President wants him to continue, he will do so. The statement was the upshot of insistent and persistent reports that the General was about to step out of NRA. The reports are without foundation, judging from the General's declaration that his proposal for a commission form of administration was not in the nature of an "adieu" to NRA. It simply means, the General said, that since the NRA has passed into the administrative field, it is more than a one-man job but that he will continue with it as a member of the proposed commission, if it is set up, provided the President wants him to do so.

The Administrator said reports that he had appointed a five-man board to run the NRA during his absence on his trip and his vacation were the bunk.

The proposed commission plan, if accepted by the President, would be set up, General Johnson said, as soon as NRA has coalesced remaining minor industrial codes under a general basic code, which now is about ready for promulgation. It was estimated it would take about two months to effect the change.

Hastings Sales Up

HASTINGS, MICH.—Hastings Manufacturing Co. report sales of Hastings Piston Rings for the first six months of 1934 exceeded sales for a similar period of 1933 by 74 per cent and the corresponding period of 1932 by 227%.

Chrysler Sets Record For 6 Months' Output

Corporation Produces 388,742 Units In First Half; Increase of 79%

DETROIT—During the six months' period just ended, a total of 388,742 Plymouth, De Soto, Chrysler and Dodge Brothers passenger cars and commercial units were shipped to dealers, breaking all records for a similar period in production and shipments of passenger cars and commercial vehicles by Chrysler Motors. This was 170,973 units more than were shipped during the same time last year, an increase of 79 per cent.

Chrysler Motors first six months shipments to dealers this year totaled 87 per cent of shipments of the entire 12 months of last year and were 75 per cent greater than total shipments during the whole year of 1932.

Production of the new Airflow cars has already passed the 20,000 mark with shipments to dealers running well ahead of last year.

Dodge Brothers shipped a total of 35,094 commercial vehicles in comparison to 12,460 during the same time last year. This was almost three times greater than the first six months of 1933.

Retail sales of Plymouth, Dodge, De Soto and Chrysler cars for the week just ended totaled 13,785 units, 7.8 per cent greater than the previous week and 10 per cent more than the same week of last year.

This was the second highest sales week in the history of the corporation.

Thirteen ancient, brass-bound cars piloted by 13 famous old time drivers competed in the Jinx Automobile Derby Friday, July 13, on the Chrysler Motors' track at the World's Fair. The cars ranged from 1896 models to those of 1907. Barney Oldfield is shown describing his 1904 Maxwell, number "13" to May Buckley, former leading lady for Otis Skinner

No Show Week

(*Continued from page* 31)

tive committee was originally empowered by the membership, it is stated, to consider the question of whether or not to continue the National Shows. This committee developed the suggestion that a national dealer show week in February should be instituted, inviting New York and Chicago dealers to manage shows in their own cities.

The automobile show week did not find favor with dealers generally as was anticipated in these columns at the time. The New York dealers then applied to run their own show at the usual time of the New York Show, making certain proposals in connection with such a show to automobile manufacturers. These were under consideration at this week's chamber meeting, at which counter proposals were drawn up intended to cover both New York and Chicago dealers' shows.

One of the decisions apparently made and agreed to by the manufacturers is that irrespective of who runs the shows in New York and Chicago or how, automobile manufacturers will discontinue the former practice of having additional shows in New York hotels.

A quick check among automobile manufacturers indicates that the majority will furnish assistance to the dealers in some form or another in running the shows, the amount depending on whether or not brand new models are being introduced at that time or not. It apparently is not likely that extensive dealer meetings will be held in either New York or Chicago at the time, but that factory representatives will headquarter in both cities during the shows seems rather certain.

A bare possibility still exists that the dealers may not decide to run the shows, in which case the whole question of National Shows would have to be taken up again of course. It is highly improbable, however, that such a development will take place.

Simple Luncheon Becomes "International" Meet

WAUKESHA, WIS.—Without pre-arrangement, an "international" meeting of automotive engineers was held here a few days ago. It was intended to be a simple luncheon for customers of the Waukesha Motor Co., but when the roll was called men from five scattered nations were found in attendance. They included Torbjorn Dillstrom, Stockholm, Sweden, chief engineer of the Hesselman Motor Co.; R. H. Ely, consulting engineer, recently arrived from Honolulu, T. H.; P. W. Rankin, consultant for Ingersoll-Rand Co.'s foreign branches, stationed at Vienna, and J. A. Giovetti, Venice, Italy, member of the Italian Government's highway commission. All were guests of Harry L. Horning, president of the Waukesha company.

Newark Offers Free Land to Get Bendix

Company's East Orange Lease Expires; So. Bend Factory Not Affected

SOUTH BEND—The Bendix Aviation Corp. is considering an offer of free land and 10 years exemption from taxes made by the City of Newark, N. J., to bring the Bendix factories to that city from East Orange, N. J. The Bendix leases on the East Orange property are about to expire. Reports of the negotiations, first circulated about one week ago, have been confirmed by Herbert Sharlock, advertising director for Bendix.

The original report stated that the Bendix company, if it moved its plants from East Orange to Newark, would manufacture automotive parts. However, according to Mr. Sharlock, the offer from Newark was for a site upon which a factory would be built for the manufacture of aviation products. Also it was reported that Bendix offered to lease the Newark site, between 30 and 60 acres, at $100 per year per acre with an option of buying the ground at the end of a 20-year period for $12,500 per acre. Confirmation of this proposal was not forthcoming from Bendix officials.

Mr. Sharlock stated the Bendix organization has not yet made any decision or taken any action in the matter. Whatever may come of the negotiations they will have no effect upon the South Bend set-up.

Knisely Succeeds Hamaker

YOUNGSTOWN—Stanley A. Knisely of Cleveland, has been appointed advertising and sales promotion manager of Republic Steel Corporation, with headquarters at Youngstown, Ohio. He succeeds L. S. Hamaker, who was recently made vice-president and general manager of the Berger Manufacturing Co., Republic subsidiary at Canton.

NRA "Interpretation" of Price Cut Rule Discriminatory, Private Buyers Hold

WASHINGTON—The NRA has interpreted the Presidential order of June 29 regarding bids on government contracts to limit price reductions below code prices to federal, state, municipal or other public authority only. Lowered prices, which can be as much as 15 per cent below filed schedules need not, according to this interpretation, be extended to other buyers.

What has been called a "semi-official" interpretation of the order is published in *The Blue Eagle*, house organ of NRA.

"Application of the order is specifically limited to industries which are code-bound to bid in accord with previously posted prices and it in NO way alters other regulations adapting government purchasing policies to the rules of NRA codes," this publication says.

"The modification order does NOT authorize the breaking of posted open prices in bidding on private work, code regulations remaining in full control. But, for the protection of both the industry and its consumers, the order requires that whenever a firm cuts below its posted price in bidding on government work, it must, immediately after the bids are opened, file a copy of its bid with the appropriate price-reporting agency. However, the previously posted prices will remain in full force until and unless changed by their makers.

"Private customers having access to the posted open prices will also have access to the filed bids and will therefore know exactly what prices are being quoted to the government and, it is expected, will guide their purchasing policies accordingly."

The statement goes on to say the purpose of the order is to restore, "within a reasonable range," the price competition of true sealed bids on all government work without undoing the beneficial effects of price reporting code requirements. The rule, it is declared, was instituted to meet repeated complaints of public purchasing agents who, though directed by law to buy from the lowest bidder, have been "insistently confronted by identical bids, set in accordance with previously filed open prices."

Aside from the rulings, however, the order has created disturbance. One reason is the concern as to the effect of the reduced prices made on government contracts may have on purchasers generally, especially the larger buyers who are increasingly exerting pressure for reduced levels. Protests also are being made by private purchasers that the federal government has no moral right at least to compel price discrimination in favor of government agencies to the disadvantage of private buyers some of whom, it is claimed, purchase much more heavily in some lines that do some of the smaller governmental agencies; in some cases more heavily than all the governmental agencies combined, agencies that are supported by such buyers in the capacity of taxpayers. Whatever the logic of the contention may be, it is a source of serious consideration. It is held that while the federal government may plead that it is engaged or is about to engage in tremendous public works enterprises calling for vast quantities of materials of many kinds and should get reduced prices on a basis of quantity-buying the same might be said for large private purchasers. Moreover, price differentials based on large-scale buying, are prohibited in the steel and other codes which provision incidentally has drawn the fire of large automotive steel buyers. The government program, of course, represents much buying by private concerns through loans. But where the government takes bids direct it would under the order get lower prices than would its borrowers who purchase direct from suppliers, yet the source of financing is identical—the United States Treasury.

Wisconsin May Regulate Finance Co. Operations

MILWAUKEE—As the result of study by a Legislative interim committee of finance companies, with hearings in Milwaukee and other large centers in Wisconsin, the next Legislature, convening in January, 1935, will be asked to adopt a law regulating all companies which finance instalment purchasing, and compelling them to state their interest charges openly on the basis of a monthly rate on unpaid balances.

According to Senator W. D. Carroll, member of the committee, there is no allegation that legitimate finance companies are overcharging for their services, but he said some instances have been uncovered where unscrupulous operators have levied excessive and usurious interest rates.

Dr. Clyde Fisher, curator of astronomy at the American Museum of Natural History and his American Indian bride, Te Ata, an interpreter of Indian folklore, leave New York City on a 12,000 mile trip in their new Pontiac to observe a delayed honeymoon and make a series of studies relating to astronomy and Indian life in the southwest

Kentuckians Can't Escape New Automobile Sales Tax

LOUISVILLE, KY.—The Kentucky Legislature has passed the bill, reported last week in *Automotive Industries*, taxing all cars purchased outside the state the 3 per cent gross sales tax when application is made for issuance of Kentucky licenses. This measure, whose constitutionality has been questioned, was passed in an effort to protect dealers located near the state borders who feared they would lose sales, because of the new sales tax, to dealers in neighboring commonwealths.

The legislature also passed a law requiring all automobile drivers to be licensed by the state. Heretofore Kentucky was one of the few states not requiring licensing of drivers.

Living Costs Continue Gradual Upward Trend

NEW YORK—The upward trend in the cost of living of industrial wage-earners, which was resumed in May after an interruption in April, was continued in June with a rise of 0.3 per cent, according to the monthly index of the National Industrial Conference Board. Increases from May to June were shown in all the major items of the wage-earner's budget except clothing. Living costs in June, 1934, were 10.2 per cent above the low of April, 1933, and 8.2 per cent higher than in June, 1933, but 20.6 per cent lower than in June, 1929.

The purchasing value of the dollar, base 1923 equals 100 cents, was 126.9 cents in June, as compared with 127.2 cents in May, 1934, and 137.4 cents in June, 1933.

Aviation Ground School Organized by Bendix Co.

SOUTH BEND—The inauguration of an aviation ground school in South Bend for the benefit of employees of The Bendix Products Corp. has met with unusual success. More than 50 students have enrolled. The ground school has for its chief instructor Captain Charles R. Bowers, and direction of the school is in the hands of M. M. Cunningham, who is also director of the Bendix Autohotive Service School. A thorough course in ground instruction is given.

Britain May Boost Car Material Content

Imports Harming Sales, Makers Reported Seeking Stringent Requirements

MONTREAL—Suddenly increased demands, materially boosting the number of cars imported into Great Britain from Canada and the United States has caused considerable concern among British car manufacturers. In fact, conditions have developed to such a point that the manufacturers, according to reports, have prevailed upon the British government to send two customs men to the Dominion to study the material content of Canadian made automobiles. Under agreements reached at the Imperial Conference held about a year ago in Ottawa 50 per cent of the materials used in Canadian car production were to be of domestic origin. Now, it is said, there is a likelihood this figure will be raised to 75 per cent.

A directly attributable cause of the increased demand in Great Britain for Canadian and American cars is the recent lowering of the horsepower tax. The response to this action was a tripling of imports, to British automotive interests an astonishing thing, since the reductions are not effective until Jan. 1, 1935. The import figures upon which the recent growth of imports was based are for the month of May as compared with the same month of 1933. However, the greatest amount of the increase went to United States made automobiles, consequently Canadian products have not shared proportionately in the increased volume of British business. Duty on U. S. products is 33 1/3 per cent ad valorem, while on Canadian vehicles it is 22 2/9 per cent. With Canadian money at a discount as compared with the Pound Sterling, Canadian factories had an advantage, but with the recently announced tax reductions this has disappeared.

So. Africa Buying More

While Canadian companies have not fared particularly well in the British Isles, their business in South Africa has shown real improvement. The Department of Trade and Commerce reports that all immediately available shipping space has been contracted for. Though Canada has no particular advantage in tariff schedules on automobiles going to South Africa, with the exception of slight concessions on valuations, this increase has been brought about through an understanding between the American parent companies and Canadian subsidiaries giving the latter the South African trade.

The real concern, therefore, is the British situation. British automotive interests see a real threat to their markets through the increased American imports and consequently their reported move to secure through governmental decree a higher Canadian material content. When the 50 per cent content agreement was made some manufacturers felt it too severe; others, able to meet the requirements, welcomed the arrangement for it presented them with a tailor-made advantage over competitors. The customs men reported to be in Canada are believed to be preparing data which would constitute a basis for consideration when the subject of increasing the required material content comes up for discussion. Automotive officials at Oshawa, Ont., said they had been informed the customs officials were in that province, but had not yet communicated with local representatives of the industry. Should British manufacturers make a formal appeal to the government for a 25 per cent increase in the material contents requirement, it is a logical conclusion that Canada and Australia also will be placed in a position of having to accept such a British Empire content in their automobile manufacture.

Big enough for two, this luggage compartment in the new LaFayette four-door, four-window sedan, but who would be so unromantic as to carry this duo there?

Corporations' 1929-1931 Income Fell 53 Billions

WASHINGTON — Analysis of corporation income tax data shows the total gross income of all corporations from 1929 to 1931 fell from $160.6 billion to $107.5 billion, and the proportion of the total that was accounted for by corporations "without net income" rose from 19.3 per cent to 51.6 per cent, according to the National Industrial Conference Board. Although a considerable fraction of the nation's business is done each year without profit, even in so-called prosperous times, the year 1931 made a new record for the volume of profitless business and the ratio of such business to the total. Figures for 1932 are incomplete, but present indications are for an even greater drop.

From 1929 to 1931 the gross income of all corporations in the manufacturing industries fell from $72.1 billion to $44 billion and the proportion of the total that was accounted for by corporations without net income rose from 17 per cent to 52.4 per cent. In this period manufacturing corporations in metals and metal products showed the largest decrease in gross income and sharpest rise in the proportion of gross income reported by corporations without net income.

Warehouses Changed

GENEVA, ILL.—The Burgess-Norton Mfg. Co. and the Dall Motor Parts Co., Inc., of Geneva, Ill., and Cleveland, Ohio, respectively, announce the change of location of three of their warehouses, namely in Boston, Minneapolis and Chicago.

These warehouses are now located at: 664 Commonwealth Ave., Boston; 1436 S. Michigan Ave., Chicago; 1227-29 Harmon Place, Minneapolis.

CALENDAR OF COMING EVENTS

SHOWS

American Transit Assoc., Cleveland, Ohio ..... Sept. 22-27
Cleveland (Automotive Service Industries) ..... Nov. 19-23

MEETINGS

American Chemical Society, Cleveland, Ohio ..... Sept. 10-14
American Welding Society, New York City ..... Oct. 1-5

ANNUAL MEETINGS

Natl. Assoc. of Motor Bus Operators, Cleveland ..... Sept. 21-22
Natl. Safety Council, Cleveland, O., Oct. 1-5
Institute of Traffic Engineers, Cleveland ..... Oct. 2-3

CONVENTIONS

American Society for Metals, New York City ..... Oct. 1-5
American Transit Assoc., Cleveland ..... Sept. 24-27
International Foundry Congress, Philadelphia ..... Oct. 22-26
American Foundrymen's Assoc., Philadelphia ..... Oct. 22-26
National Foreign Trade Council, New York ..... Oct. 31-Nov. 2

EXPOSITION

Natl. Exposition of Power & Mechanical Engineering (Biennial) New York, N. Y. ..... Dec. 3-8

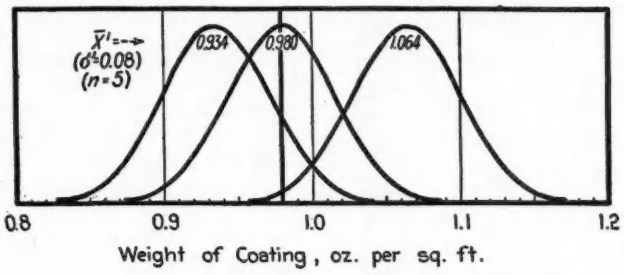


Fig. 1.—Distributions of Average, $\overline{X}$, for Three Universe Values of $\overline{X}'$. (Samples of $n = 5$.)

Statistical Methods a Practical Tool for

WHEN you specify that the minimum thickness of the nickel coating for a fussy chromium plating job is to be 0.0003 in., does that assure control of the process? When you say that the average tensile strength of a material shall be so much, what percentage of a given lot comes above or below the limit—and if you specify limits, have you chosen economical values?

If a manufacturing specification says that the inspector is to check one piece in ten or one in 125, upon what considerations is the sample size based?

Believe it or not, these and many other practical questions of process control vitally interesting to the research engineer, metallurgist and factory executive can be reasonably answered by anyone who will take the trouble to investigate the art of statistical control. And fortunately, although the statistical method in engineering has been conspicuous by its absence, it is no longer necessary to be a statistician to use it in engineering work.

Statistical methods will be found of great value in any problem involving the specification and control of quality. They can be employed in research, in many phases of inspection of raw and finished product, and as a means of analyzing lack of control of manufacturing processes, thus leading to better control at lower cost.

Does it sound too good to be true? Then investigate it for yourself and particularly note the progress already made in its practical applications.

While it is obviously impossible to cover the subject here in a fashion that might provide a working knowledge, we do expect to point out some of the high spots; also to mention some practical applications. For a working knowledge of statistical control we refer the reader to a recent text by W. A. Shewhart, "Economic Control of Quality of Manufactured Product," D. Van Nostrand (1931).

A more condensed treatment, possibly much easier to follow, will be found in a manual published last year by the A.S.T.M., "1933 A.S.T.M. Manual on Presentation of Data." The manual approaches the problem from the viewpoint of what is good data, how much good data is needed, and the most economical way of presenting the facts. It really gives a remarkable working background and provides the few simple tools needed by the engineer.

Briefly, the method of analysis employs three statistics or criteria relating to the values being measured. There are other criteria but the three mentioned here have the greatest practical significance. First is the arithmetic mean—or "average" denoted by the symbol, $\overline{X}$, then the "fraction defective" or percentage defective, p, and the third, σ, the "standard deviation" which is a measure of the dispersion of values of the variable about the mean. Knowing the significance of each criterion, it is possible to use them alone or in combination to give the desired control.

Years of effort on the part of people who have sponsored the use of statistical methods in engineering bore fruit at the 37th annual meeting of the A.S.T.M. held recently at Atlantic City. Not only did the program include a special technical session on the subject, but a number of papers on the general program utilized the method in their presentation. These papers will be briefly reviewed.

H. F. Dodge of the Bell Telephone Lab., one of the best informed engineers on this subject, discussed in his paper, "Acceptance-Rejection Requirements in Specifications," the use of two simple criteria. He considered the checking of processes such as plating, finishes in general, hardness, and the like, where destructive tests usually are required and where, obviously, only a small number of random samples may be tested. In such cases one is prone to use either the "average" or "fraction defective" alone, and they are indeed simple tools. Dodge shows their practical limitations.

In applying these criteria, the first step is to determine the intent of the engineering specification with respect to the minimum value of the variable to be measured. Which statistic is to be used, what sample size, etc., must be determined from a practical knowledge of the specification requirements and

Table I—Average Rockwell Readings On Series C Specimens

100-kg. load, $\frac{1}{16}$-in. ball, 5 observations on each thickness.

Specimen	Thickness, in.	Average, $\overline{X}$	Standard Deviation, σ	Description of Impression
C-1	0.047	46.18	0.3374	Prominent cone. Polished bottom.
C-2	0.0425	45.38	0.4308	Prominent cone. Slight bulge. Boundaries irregular.
C-3	0.039	44.36	0.2870	Cone decreasing. Bulge larger, round and well defined.
C-4	0.035	44.32	0.2712	Cone decreasing. Bulge higher, diameter smaller.
C-5	0.0305	43.80	0.2097	Cone decreasing. Bulge higher, diameter smaller.
C-6	0.0265	43.10	0.4146	Cone decreasing. Bulge higher, diameter smaller.
C-7	0.0215	43.04	0.3929	Depression. Bulge higher, diameter smaller.
C-8	0.016	41.40	0.5656	Depression. Bulge higher, diameter smaller.
C-9	0.012	44.16	1.5965	Depression. Bulge higher, diameter smaller.
C-10	0.0085	42.26	1.1898	Depression. Bulge higher, diameter smaller.

by Joseph Geschelin
Engineering Editor, Automotive Industries

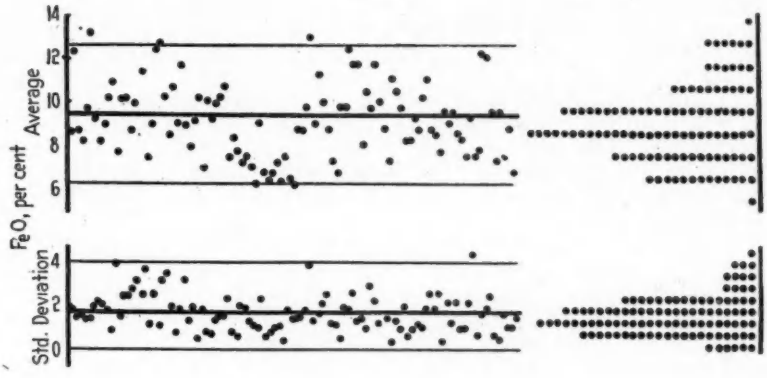


Fig. 2.—Control Chart for FeO in Open-Hearth Slag.

Provide Engineers with the Control of Quality

Technique has been proven to be of great value in industrial research, inspection and the control of manufacturing processes

an understanding of the statistical tools.

The simplest but least efficient criterion is "fraction defective," p, in the use of which a sample of a given number of pieces, say 5 or 10, out of each lot is inspected and the entire lot accepted if no defects are found. Its inefficiency lies in the fact that the consumer is taking the risk of accepting a rather high tolerance for defects in individual lots. While there are applications that may warrant this simple sampling method, the author recommends the use of some other criterion in combination so as to give a more accurate picture of the actual distribution of values. Incidentally, the information required for complete control by means of two criteria is as readily available as it is for a single criterion.

It is shown that if protection is desired against a relatively small percentage of defects in a lot, the number of pieces in the sample must be large. Consequently it is more economical to use a small smaple size but subject it to several control checks.

In using "fraction defective," p, alone as a criterion, one solution in the interest of simplicity is to specify a small check sample to test control; then to inspect a large "referee sample," at least three or four times the size of the standard to determine the distribution of quality.

Use of the "average" alone presumes in a simple case that a given lot will be accepted if the averaged measured value of the variable for a sample is not less than (or not greater than) some stated value. This assumes that the dispersion of values about the mean value is not very important.

Both of the foregoing criteria are associated with the probability or frequency distribution curve which might be plotted from values obtained if every piece in a given lot were to be inspected. Moreover, the validity of the method hinges upon the assumption that the process is under control. Fig. 1 shows the situation rather graphically.

Here is a problem of testing for the weight of galvanized coating for a particular size of steel strand and it it is assumed that the specification requires tests on five ($n = 5$) 24-in. lengths of wire selected in a specified manner from the lot, and requires the average of these five tests to be not less than $X_L = 0.980$ oz. per sq. ft. Say that a lot is to be accepted if the average of the sample is equal to or greater than this minimum value of 0.980 and is to be rejected or considered non-conforming if the average is below this value.

From Fig. 1 we note the possibility of selecting five samples from three different lots of material, one having an average of 0.980, the other, 0.934, and the third, 1.064. It is conceivable that the samples from each lot may run at about the specified minimum value and thus would permit the acceptance of each of the three lots. Actually, Dodge shows that of the total number of pieces in the first lot only one piece in 10 will conform; of the second lot only half will conform; while in the third lot, 99 out of 100 will conform.

This means if the particular characteristic or measurement is important, and it usually is, the safety level in respect to average quality is safeguarded

only by the proper selection of values specified for (*a*) acceptance limit for the sample average and (*b*) the sample size. A larger random sample will give a better indication of the character of quality distribution.

In a similar fashion, where fraction defective alone is used as a criterion, it is conceivable that small samples from all three lots pictured in Fig. 1 may conform with the specification, despite the fact that most of the lot described by the curve at the left is below the specified quality.

In this analysis we must bear in mind that where the given variable is important, the foregoing would represent a lack of control. In the extreme, some lots are of inferior quality, others are at too high quality level, which is always uneconomical and ofttimes objectionable. However, with the aid of the facts presented by the statistical method we can set up different specification standards which in themselves may change the process, thereby altering the form of the distribution of values in the lot. When the causes of variation are discovered the process will be under better control and even the simple inspection method, employing only one criterion, may be sufficient to assure the specified quality.

Dodge therefore concludes that the use of a single control measure may, in some cases, provide all the protection that is needed. However, certain control combinations, such as average and the standard deviation, or fraction defective and standard deviation, etc., when used together, will provide better discrimination between desirable and undesirable levels of quality.

Use of the standard deviation, the measure of dispersion of values of the variable in a given lot, is examined at some length by W. C. Chancellor of the National Tube Co., in his paper, "Application of Statistical Methods to the Solution of Metallurgical Problems in the Steel Plant." He makes the point when it comes to a complex problem such as steel production where a large number of variables are concerned, it is unsafe to rely upon the frequency curve above or either of the two criteria mentioned by Dodge because of the possibility of lack of statistical control within the production process.

This demands the use of something that will measure the dispersion of values about the mean, or the minimum, and the requirement is met by the standard deviation. It is shown that the standard deviation (square root of the mean of the sum of the squares of the sample values minus the square of the mean value) not only is a measure of variation of quality but also aids in locating the cause for variability and thus leads to controlled conditions. When the "assignable" or erratic causes of variation have been located and the process changed to eliminate them, the commercial tolerances about the specification quality automatically becomes more narrow without increasing the cost of production.

Chancellor uses "control charts" rather than frequency curves and employs values averaged from rational subgroups rather than a large mass of individual data. These charts cannot be plotted as a practical matter until a fairly satisfactory estimate has been made of the true average and the true standard deviation, on the basis of past history or a large number of tests. The chart consists of three parallel lines, the central one being the desired or true average, the outer lines being tolerance limits. Limit lines include all values falling in the range $\overline{X} \pm 3\sigma$. According to the mathematical theory, checked by years of observation of phenomena in every field of research, if, n, observations are taken for the average, 99.74 per cent of all values in a given lot will fall within the control limits specified by this relation. Consequently, when a large number of sample values fall within the limits of a control chart, the process may be said to be under statistical control.

Fig. 2 shows an actual set of control charts used by Mr. Chancellor. Four hundred and sixteen individual heats are involved, these being grouped into 104 groups of four heats each ($n = 4$), selected in chronological order. "For identification of individual heats, the different groups are given consecutive numbers and a record kept of the heat numbers in each group. From the data available, the average and the standard deviation of each sample of four were calculated, as well as their limits of chance variation. Control charts were then constructed as shown and the individual groups plotted in chronological order.

"In order to assist in visualizing the meaning of these charts, the individual points plotted in the control charts have been 'pushed down' to a base line and grouped in intervals. It is seen that they tend to form frequency curves; that is, we have a frequency arrangement which shows the way in which these averages and standard deviation, based on four slags each, are varying.

"By examining the data in Fig. 2, it will be seen that there are few points out of control, either for average or for standard deviation."

Control charts of this nature may be used in many ways not only in metallurgical and general research problems such as this one, but also in sampling inspection of machined or manufactured parts. For a more detailed explanation of control charts and their construction the reader is referred to the text by W. A. Shewhart.

According to R. L. Templin, chief engineer of tests, Aluminum Co. of America, frequency charts have been used in his laboratories for many years. In practice, the control consists simply of keeping a running log, in the inspection department, of readings of significant values such as Brinell hardness of forgings or castings and digesting this mass of data periodically. Frequency charts plotted from such logs show the dispersion about the mean and the character of variations. A similar procedure could be employed in almost any plant in the routine inspection of raw materials, bar stock, castings, etc. It could be applied, for example, to note the variation in the Brinell hardness of chrome-nickel cylinder blocks, or the hardness of forgings, etc., over some given period, such as a day or a month or a year.

Templin employs the statistical method in his A.S.T.M. paper, "Some Factors Affecting Strain Measurements in Tests of Metals" which concerns the variations in measured strains, in terms of stress for certain common shapes. In an attempt to give a better picture of the variations of strain measurements occurring in a compression specimen, the data for the I-beam specimen have been plotted in the form of frequency diagrams in Figs. 3 and 4. "Using the methods advocated in the Society's Manual on Pres-

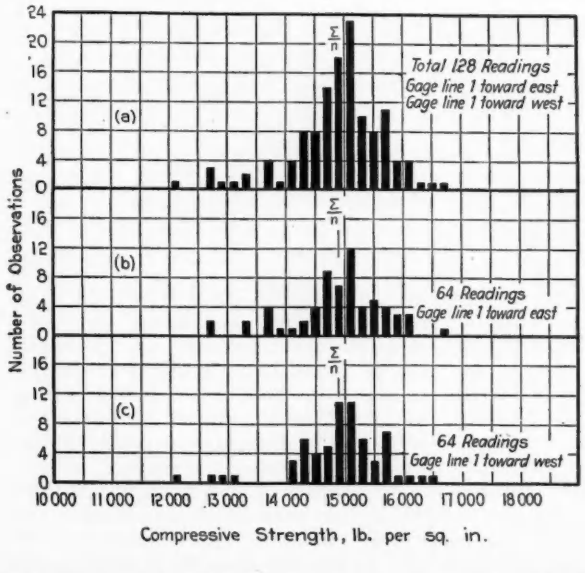

Number of Observations
(a)
(b)
(c)
Total 128 Readings
Gage line 1 toward east
Gage line 1 toward west
64 Readings
Gage line 1 toward east
64 Readings
Gage line 1 toward west
10 000 11 000 12 000 13 000 14 000 15 000 16 000 17 000 18 000
Compressive Strength, lb. per sq. in.

Fig. 3.—Frequency Diagrams for Strain Measurements on 5-in. I-Beam Specimen in Compression.

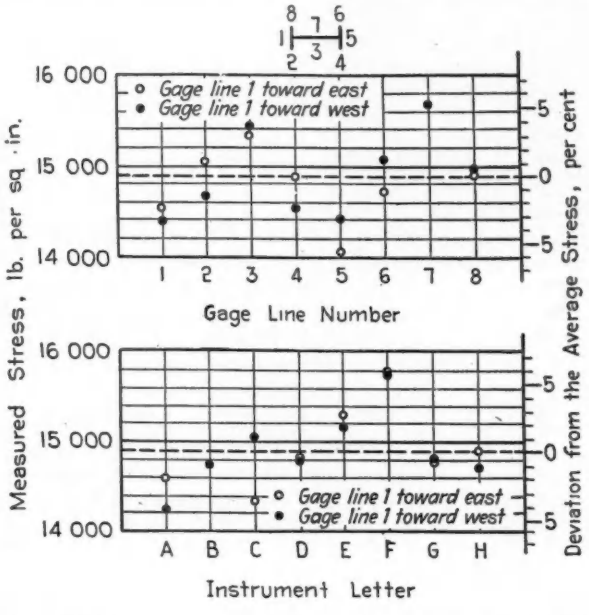


Fig. 4.—Chart Showing the Average Measured Stresses for Each Gage Line and Each Tensometer, for the 5-in. I-Beam in Compression.

entation of Data, it is found that the measured average stress in this specimen in 14,890 lb. per sq. in., when the nominal value is 15,500 lb. per sq. in. Measured values ranging from 12,030 to 16,690 lb. per sq. in. are observed. Breaking down these data shown in Fig. 3 (*a*), so as to take account of the two positions of the test specimen in the testing machine, we find about the same picture as shown in Figs. 3 (*b*) and (*c*). If the data, however, are plotted on the basis of gage line number and instrument letter, as shown in Fig. 4, and the results so obtained correlated with the information given in Fig. 3, we find that the low readings represent a combination of a low-reading instrument and a low-reading gage line, and in the same way the high values represent the combination of a high-reading instrument with a high-reading gage line. It is evident from a study of the diagrams in Fig. 4, that the errors resulting from location of gage lines are of the same order of magnitude as those caused by the instruments used."

This paper, in the same manner as the Chancellor paper, indicates the usefulness of rational sub-groups of data instead of single values. Each plotted point in Fig. 3 and 4 represents the average of eight readings, either eight extensometers of each side or each extensometer on eight gage lines.

R. L. Kenyon also used some of the principles of statistical control in his paper, "Effect of Thickness on the Accuracy of Rockwell Hardness Tests on Thin Sheets." The object of the paper is to call attention to the need for definite limits for thickness of specimens for Rockwell tests and to indicate a method of approaching the problem. The data indicate that it should be possible to establish minimum values for thickness for materials having definite surface characteristics.

In view of the variables involved, the preparation of test specimens was of course of greatest importance. "The method finally adopted was to use only material of uniform composition throughout the entire thickness. Low-carbon killed steel serves this purpose admirably. Sheets of the maximum desired thickness were then heat treated to obtain uniform grain structure and hardness over their surface and throughout their thickness.

"In order to test the uniformity over the surface, about 20 pieces ½ by 4 in. were cut in succession and numbered consecutively. Five Rockwell impressions were made on the alternate pieces. When the average of these all fell within the limits $\overline{X} \pm 3\,\overline{\sigma_x}$, the material was considered to be uniform. The test specimens were prepared from the alternate pieces.

As indicated earlier this is the method used to prove that the specimens are in statistical control. Table 1 shows the log used by Kenyon in determining the values of the "average" and "standard deviation" as evidence of statistical control of hardness for each test piece, using the relation in the preceding paragraph.

The foregoing are just a few examples of the practical applications of statistical control. It is hoped that these may indicate the approach to similar problems in research and production. One can derive the greatest benefit not so much from an understanding of the mechanics of the statistical method as from the new philosophy of engineering that it provides. Although the conception of a process under statistical control is novel in engineering, it is the only condition in which information about the variable may be safely trusted.

Triple Cam Gives Maximum Lift—Corrections

A NUMBER of typographical errors unfortunately crept into the article on the above subject by Chris H. Bouvy in *Automotive Industries* of June 16. Corrections are given below.

Page 740, column 3:

$V_n = \frac{dE}{dt}$ should read $V_n = \frac{dL}{dt}$

$V_{fl} = E_{fl} \sin \phi$ should read $V_{fl} = E_{fl}\, \omega \sin \phi$

Page 742, 3rd column:

$\beta = \alpha - (\phi_{max} - \theta_{max})$ should read
$\beta = \alpha - (\phi_{max} + \theta_{max})$ in two places

Page 742, 3rd column:

If the tappet radius $d/2$ and the flank-eccentricity E_{fl} are given, we can find the values of ϕ_{max} and θ_{max} in degrees from these equations.

This should read:

If the tappet radius $d/2$, the nose-eccentricity E_n and the flank-eccentricity E_{fl} are given, we can find the values of ϕ_{max} and θ_{max} in degrees from these equations.

Further:

$L_{total} = L_{fl} + L_n + L$
$L_{total} = E_{fl}\,(1 - \cos \phi_{max})$
$+ E_n\,(1 - \cos \theta_{max})$
$+ d/2 \times 0.0174533$

This should read:

$L_{total} = L_{fl} + L_n + L\beta$
$L_{total} = E_{fl}\,(1 - \cos \phi_{max})$
$+ E_n\,(1 - \cos \theta_{max})$
$+ d/2 \times \beta \times 0.0174533$

Page 743, 1st column:

Cam III is laid out with the maximum permissible nose radius of 1 in. With this nose radius a flank radius of 1.4 in. is necessary in order not to exceed the maximum allowable velocity of 0.5 in. per second.

This should read:

Cam III is laid out with the maximum permissible nose eccentricity of 1 in. With this nose-eccentricity a flank-eccentricity of *1.14* in. is necessary in order not to exceed the maximum allowable velocity of 0.5 in. per second.

Page 743, 1st column:

Cam IV is laid out with the maximum permissible flank radius of 3.5 in., which results in a nose radius of 0.675 in.

This should read:

Cam IV is laid out with the maximum permissible flank eccentricity of 3.5 in., which results in a nose eccentricity of 0.675 in.

Page 743, 2nd column:

The maximum acceleration is limited by the allowable maximum tappet load; the maximum deceleration is equal to the nose radius and therefore limited to half the camshaft bearing diameter minus the nose radius.

This should read:

The maximum acceleration is limited by the allowable maximum tappet load; the maximum deceleration is equal to the nose eccentricity and therefore limited to half the camshaft bearing diameter minus the nose radius.

Page 744, 3rd. column:

Total lift $= bB + cC + hH$ should read
Total lift $= bB + cC - hH$

JUST AMONG OURSELVES

Unemployment Reserve Laws a Certainty

NASH, Waukesha and presumably several other automotive concerns in Wisconsin are beginning operations under the recently effective Unemployment Compensation Act in that State.

The Wisconsin law and its application in practice should have the careful study of every automotive executive. As we pointed out recently, both major political parties are more or less committed to unemployment insurance legislation. Every straw in the wind points to the fact that some such program will be forced on American industry unless industrialists as a group develop a program suitable for national operation.

Wisconsin employers were given a chance to get plans into operation voluntarily. Scarcely any of them did, probably because even the more socially-minded among them hesitated to put themselves at a financial disadvantage by setting up unemployment reserves when competitors did not. Consequently the legislation passed several years ago automatically has gone into effect.

Similar factors naturally militate against widespread adoption of unemployment reserve plans by individual manufacturers in general. But individual automotive employers should get interested in the subject very definitely *now*, so that they will be in a position to function constructively and intelligently with legislators when development of a national plan gets toward the detail stage.

Social justice as well as political pressure is on the side of some sort of unemployment insurance. The extreme difficulties involved in development and application of a workable plan should not be permitted to obscure the need for nor to stymie positive thinking regarding the project.

* * *

What the Yankees Think About Codes

VERY few representative New England manufacturers think that NRA codes have been hurtful to their businesses—and 44 per cent of them think their codes definitely have been helpful. Only 8 per cent, to be exact, think codes have been hurtful; the remaining 43 per cent see no effect from codes one way or the other.

Developed by the New England Council from opinions received from more than 850 manufacturers, these figures indicate clearly that automotive opinion of the NRA and NRA codes is not typical of all manufacturing groups. It is hardly likely that a confidential automotive inquiry would find 44 per cent voting the codes to be helpful.

Many of the New Englanders think some kind of code permanently desirable or essential—43 per cent, in fact, want some form of code made permanent with government sanction or supervision; 35 per cent want permanency without government supervision. It was the little fellows, the survey showed, who were opposed to codes without government supervision. On all other points, the big and the little manufacturers agreed.

Asked whether they were satisfied with the compliance given their codes, 44 per cent answered "Yes" and 37 per cent, "No." The rest didn't answer.

* * *

Should Caesar's Wife Put Her Feet on the Desk?

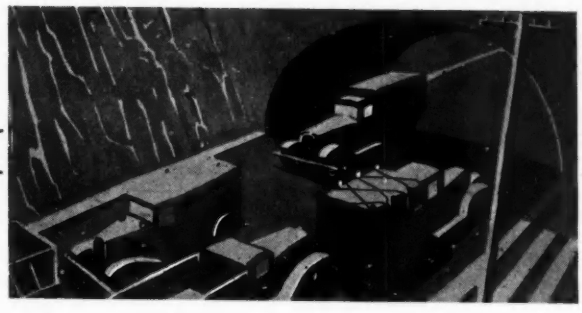
WARNING members of his department to keep busy during working hours, Secretary of the Interior Ickes has raised again that vital question which has stirred office controversy ever since we can remember—"What goes on in a man's head when he has his feet on the desk?"

Inveighing against the practice, Secretary Ickes disposes of the claim of many feet-putter-uppers that they think better that way with the none too penetrating query: "I wonder what they think with?"

He is on sounder ground perhaps when he urges that such practices at least give the appearance of loafing and for that reason should be discouraged in large offices where every employee is more or less under the same compulsion against the appearance of evil as was Caesar's wife.

Despite the fact that personally what we think about when our feet are on top of the desk is how nice it would be to go to sleep, it is hard to forget that two of the keenest, clearest, most alert thinkers we have ever been associated with in business are confirmed feet-putter-uppers.

So momentous an issue, certainly, should call for comment from our readers. What do you think.—N. G. S.



Strong Highway Users Groups Needed in Every State to Fight Unfair Taxes

ENMESHED in burdensome and menacing taxation, much of it without justification, the highway users of the nation, as well as the automotive and petroleum industries, face a future freighted with deep concern. It is essential that ways and means be found and developed to a potency which will remove the hampering, uneconomic bonds of unwise taxation upon motor vehicles and fuels, which is causing a curtailed use of the highways and tending to offset the important contributions these two basic industries are making to national recovery.

The National Highway Users Conference and the automotive and petroleum industries have been waging a courageous fight against excessive and unwise taxation. But today these efforts must be augmented, and it is imperative that the aid of highway users be enlisted more widely. Whatever moves are made in the direction of reduced taxation, they must be made with the consolidated force of a well planned compaign based upon mutual interests. The obvious method appears to be the most effective—a coordinated group of individually strong and active Highway Users Conferences in every state, for here lies the greatest numerical strength of the taxed. Permanent maintenance and constant strengthening of these conferences are commandingly necessary during the coming year if this problem of taxation is to be successfully combated. These needs may be summarized as follows:

1. To organize strong state Highway Users Conferences.
2. To bring into these organizations a strong representation of the business interests which are increasingly dependent upon highway transportation. Thus far the automotive and oil industries have done most of the work. Manufacturers, commercial houses, builders, wholesaling, jobbing and all kinds of commercial interests have just as good reasons to be actively interested, but they have not been aroused to the fact. They should be. The tendency to decentralize industry, to conduct it in smaller and more scattered units; and the conduct of business with smaller inventories, necessitating quick deliveries; these things together with the fact that railroad freight service is becoming less and less adequate to providing the facilities business needs, ought to be persuasive with every kind of business, as to necessity for making the most of highway transportation. Department stores, mail order houses, chain stores and all manufacturers, along with livestock markets, fruit and produce markets, and all manufacturers are increasingly dependent on this kind of transportation; yet they have not been brought into effective coordination with the highway user movement.

Six months hence legislatures will convene in many states. All will be confronted with the necessity of raising additional revenues, and the automobile and its fuel will as usual be the most obvious victims for additional taxation. In 1933 all taxes borne by highway transportation, and by the industries which make it possible, aggregated around $1,500,000,000. In that year the total of all taxes actually collected from this source, according to the National Industrial Conference Board, was about one-fifth of the nation's public revenue. Despite the enormity of this burden, it will be much greater in 1935 unless highway interests make determined fights in all the states.

In 1933 about $518,000,000 gasoline taxes were collected by the states and a committee of the American Petroleum Institute finds that $168,000,000 was diverted to other than highway construction and maintenance purposes.

The increasing imposition of local gasoline and license taxes, by counties, cities, towns, school districts, and improvement districts is nearing menacing proportions. Highway user taxes are now extensively used for relief, schools, and general government purposes. The danger in this method of tax distribution is shown by the fact that wherever these taxes have become most burdensome, the sales of cars and fuel have fallen off; while in the states where the taxes still remain comparatively modest, the use of cars and the consumption of their fuel has gone on increasing. The point of diminishing returns has been reached in many states; a recent A.P.I. Committee Bulletin listed 118 different taxes borne by the automobile, the automotive and oil industries, and automobile operators. In finding still more taxes to impose, the ingenuity of legislators seems endless.

In all directions but one, the cost of automobiles and their operation has been steadily coming down. That one exception is taxes. The tax of 5.41c. per gallon of gasoline was a sales tax of more than 100 per cent of the manufacturer's cost. Federal, state and local gasoline and lubricating oil taxes in 1933 totaled $843,000,000. The significance of this total is manifested by a comparison with the total wholesale value of all passenger cars and trucks manufactured in the country in 1932 which was $793,045,000, according to the National Automobile Chamber of Commerce. That is, gasoline and lubrication taxes were $50,000,000 more than the wholesale value of all vehicles manufactured that year.

The time has come when the public must be made to realize there no longer is justification for such taxation. At the end of 1932 the U. S. Bureau of Public Roads reports there were 266,060 miles of surfaced state highways—modern, perfected roads, articulated and making a unified national system. If to this mileage is added the new con-

struction in 1933 and 1934, the total will be a figure well beyond 300,000 miles by the end of this year.

With the national road system nearing the point of completion, the whole problem of highway finance enters a new phase. In many states the point has already been reached where maintenance of the present system, rather than its year-by-year expansion, should be our chief concern. A tax rate of 2 cents per gallon on gasoline would amply maintain the highway system in first class condition, and leave a reasonable amount for new mileage construction. The objective should be to have the national tax rate reduced to this basis of 2 cents; and of course the Federal tax, which last year was 1½ cents, and is now 1 cent, ought to be repealed.

Opposition to excessive taxation of this kind has been gaining ground; with proper organization it could produce results. In Missouri a constitutional amendment was adopted, by referendum vote, limiting the gasoline tax to 2 cents per gallon for a period of ten years; and with that 2 cent tax the state has built a splendid system of roads. Missourians feel there is not the remotest chance that their tax will ever be higher. In Michigan, where the tax rate is 3 cents, the automobile clubs have just finished the circulation of a referendum petition demanding submission to referendum of a constitutional amendment fixing 3 cents as the limit of this tax. The petitions it is understood are to be filed at the state capitol, and the amendment will be voted on next November. There is considerable confidence that it will be adopted.

In approximately 15 states it is possible in substantially this manner to secure the submission of such proposals; it might well be part of a Highway Users' organization's business to put on campaign similar to the Michigan method.

The reason for urging the organization of state conference of Highway Users in all states is that the state organization has vastly more influence at Washington than any national organization can exert. The State conference of a given state has specific, definite, direct and personal influence with the Senators and Representatives from a particular state; whereas a national organization has at best only a remote and rather vague influence. Pennsylvania organized a most efficient and effective state group. It has proved effective at Harrisburg in preventing tax increases and in defeating the efforts of the railroads to hamper commercial highway transportation by subjecting it to impossible regulations. At the same time, the Pennsylvania organization has also been helpful in dealing with the State's delegation at Washington.

Every one interested in highway transportation believes that in the last few years the railroads have spent large sums in propaganda, lobbying, and legislative manipulation, for the purpose of crippling highway transportation. Obviously they have been grossly mistaken in imagining the highway to be a dangerous competitor. Rather, the automotive and petroleum industries, plus the operation of trucks, have brought to the railroads many times more tonnage than they have taken from the roads. Nevertheless the railroads have seemed determined to hold commercial highway transportation to a minimum.

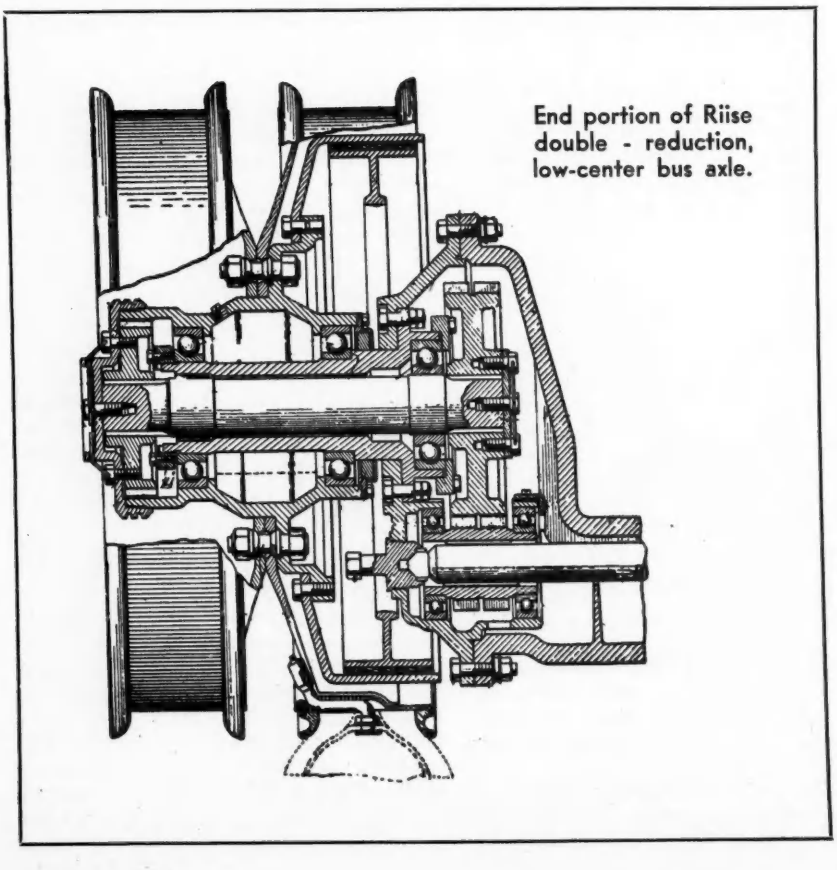
Instead of being on the defensive, the automotive and oil industries must take the offensive. All the railroads in the United States, valued by the Interstate Commerce Commission at nearly $22,000,000,000, paid less that $280,000,000 in taxes in 1932; the special taxes of the automotive and petroleum industries were more than four times that much. Every owner of a motor vehicle should be made to realize what this means, and enter his protest.

Riise Double-Reduction Axle Design for Buses

A cranked type or low-center drive axle for motor vehicles, and particularly for buses, has been designed by John Riise of Doylestown, Ohio. A sectional view of the axle end, which shows all of the features peculiar to the design, is reproduced herewith.

The axle is of the so-called double-reduction type, the first reduction being effected by means of a pair of bevel gears at the center and the second reduction by a pair of herringbone or similar gears at each hub. As may be seen from the drawing, there is a stationary hollow spindle for the driving wheel, which is flange-bolted to the housing enclosing the final-drive gearing. Through this hollow spindle extends a solid driving spindle which at its inner end carries the driven gear of the final drive member and at its outer end connects by a driving clutch to the wheel hub, which latter is mounted on the outside of the hollow spindle on two anti-friction bearings. This places the rear axle drive shafts below the wheel axis a distance equal to the center distance of the final drive gears. These driving shafts are enclosed in the rear-axle housing, which thus is also lower than usual and permits of a low chassis frame.

This axle was first developed some years ago and has been actually built by the inventor and tried out in a bus for upward of 100,000 miles.



End portion of Riise double - reduction, low-center bus axle.

Passenger Car Sales

	May, 1934	Per Cent Increase, May, 1934, over May, 1933	Per Cent Change May, 1934 over April, 1934	Five Mos. 1934	Per Cent Increase, Five Mos. 1933 1934, over Five Mos. 1933	Per Cent of Total First Five Months 1934	1933
Ford	67,993	194.0	+9.8	230,781	136.5	29.86	19.20
Chevrolet	57,793	10.2	−8.9	204,121	16.5	26.43	34.48
Plymouth	33,280	33.3	−2.7	124,835	77.8	16.19	13.80
Dodge	9,058	12.6	−21.4	40,188	66.1	5.22	4.76
Pontiac	9,238	−9.9	−4.0	32,675	0.5	4.25	6.40
Oldsmobile	9,330	113.0	+4.7	25,149	89.6	3.27	2.61
Buick	5,310	−2.5	−17.6	22,664	15.2	2.94	3.87
Terraplane	5,451	43.9	−6.0	18,006	66.0	2.34	2.13
Studebaker	4,140	18.5	−15.2	17,665	34.6	2.29	2.58
Chrysler	3,713	37.4	+5.0	9,826	5.9	1.28	1.83
Hudson	2,705	664.1	−14.8	8,983	542.0	1.17	.28
Nash	1,738	42.0	+15.8	7,071	58.5	.92	.88
Graham	1,535	51.2	−16.5	5,638	40.0	.73	.79
DeSoto	1,458	−22.1	+5.7	4,488	−38.7	.58	1.44
Cadillac	683	44.6	+1.7	2,436	33.5	.32	.36
Willys	825	−68.0	+106.1	2,411	−62.2	.31	1.30
Packard	516	−49.0	−20.1	2,224	−42.2	.29	.76
Hupmobile	657	−18.0	+28.0	2,036	−28.2	.27	.56
La Salle	963	144.0	+23.1	1,998	43.1	.26	.27
Auburn	597	39.3	+60.0	1,822	−20.2	.24	.45
Reo	519	40.5	+98.9	1,432	18.1	.19	.24
Lafayette	978	—	+291.0	1,426	—	.18	—
Lincoln	225	−12.2	−3.8	886	−5.7	.11	.18
Continental	45	−74.4	−53.6	869	88.2	.11	.09
Pierce-Arrow	211	25.5	+11.6	741	5.1	.10	.14
Austin	85	−76.0	−32.6	683	−62.1	.09	.35
Franklin	96	−25.5	+108.5	279	−47.5	.04	.10
Miscellaneous	21	−86.5	−34.3	146	85.8	.02	.15
Total	219,163	36.9	−1.7	771,479	52.0	100.00	100.00
Chrysler Corp.	47,509	26.3	−6.4	179,337	61.9	23.27	21.83
Ford and Lincoln	68,218	109.0	+9.8	231,667	135.0	29.97	19.38
General Motors	83,317	13.6	−7.2	289,043	18.7	37.47	47.99
All Others	20,119	21.0	none	71,432	30.0	9.29	10.80

Retail Unit and Dollar Volume by Price Classes

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—May

	UNITS					ESTIMATED DOLLAR VOLUME				
	1934	1933	Per Cent of Total 1934	Per Cent of Total 1933	Per Cent Change	1934	1933	Per Cent of Total 1934	Per Cent of Total 1933	Per Cent Change
Chevrolet, Ford and Plymouth	159,066	109,813	72.6	68.5	+45.0	$100,000,000	$58,000,000	63.8	55.2	+22.6
Others under $750	6,601	27,549	3.0	17.2	—76.0	4,900,000	18,000,000	3.1	17.1	—72.8
$751-$1,000	43,351	11,633	19.8	7.3	+272.0	35,100,000	11,000,000	22.4	10.5	+219.0
$1,001-$1,500	6,374	7,493	2.9	4.7	—15.0	8,000,000	9,000,000	5.1	8.6	+11.1
$1,501-$2,000	2,112	2,523	1.0	1.6	—16.3	3,700,000	4,000,000	2.4	3.8	—7.6
$2,001-$3,000	1,189	67	0.5	..	+1,780.0	3,300,000	.....	2.1	..	...
$3,001 and over	449	1,051	0.2	0.7	—57.3	1,800,000	5,000,000	1.1	4.8	—64.8
Total	219,142	160,129	100.0	100.0	+36.8	$156,800,000	$105,000,000	100.0	100.0	+49.1
Miscellaneous	21	113								
Total	219,163	160,242								

U. S. New Car Registrations and Estimated Dollar Volume by Retail Price Classes—Five Months

	UNITS					ESTIMATED DOLLAR VOLUME				
	1934	1933	Per Cent of Total 1934	Per Cent of Total 1933	Per Cent Change	1934	1933	Per Cent of Total 1934	Per Cent of Total 1933	Per Cent Change
Chevrolet, Ford and Plymouth	559,737	342,859	72.6	67.6	+63.1	$348,000,000	$187,900,000	63.6	54.8	+85.3
Others under $750	44,888	84,355	5.8	16.6	—46.8	31,700,000	54,700,000	5.8	16.0	—42.0
$751-$1,000	127,181	40,059	16.5	7.9	+218.0	104,100,000	34,900,000	19.1	10.2	+198.5
$1,001-$1,500	26,816	25,784	3.5	5.1	+4.0	33,900,000	29,600,000	6.0	8.8	+11.4
$1,501-$2,000	6,359	6,597	0.8	1.3	—3.6	11,200,000	11,100,000	2.0	3.2	+1.0
$2,001-$3,000	4,653	5,201	0.6	1.0	—10.6	12,300,000	12,600,000	2.3	3.8	+1.5
$3,001 and over	1,699	2,621	0.2	0.5	—35.1	6,800,000	10,600,000	1.2	3.2	—35.8
Total	771,333	507,476	100.0	100.0	+52.0	$547,600,000	$341,400,000	100.0	100.0	+60.5
Miscellaneous	146	701								
Total	771,479	508,177								

U. S. New Car Registrations and Estimated Dollar Volume by Manufacturing Groups—Five Months

	Percentage of Total Units 1934	Percentage of Total Units 1933	Percentage of Total Estimated Dollar Volume 1934	Percentage of Total Estimated Dollar Volume 1933
Chrysler Corp.	23.1	21.8	23.2	19.9
Ford and Lincoln	30.1	19.4	25.3	16.9
General Motors	37.5	48.0	40.0	48.5
All Others	9.3	10.8	11.5	14.7
	100.0	100.0	100.0	100.0

The Forum—

Why An Automatic Transmission Anyhow?

Editor, AUTOMOTIVE INDUSTRIES:

After reading Mr. Heldt's stimulating series of articles on the automatic transmission problem, and the letters published in the Forum since then—especially those of Oldfield, Bazzeghin, Booth and Nikonow—I am urged to suggest that Mr. Oldfield's reminder that a clearly stated problem is already half solved, is excellent and timely. In other words, what do we really mean by an "automatic transmission" when we start talking about it? And the answer to that depends in turn on our answer to the question: Why an automatic transmission, anyhow?

What It Must Do

It would be hard to find a better statement of the need, and consequently of the problem, than that quoted by Mr. Oldfield: "A satisfactory automatic transmission . . . operates smoothly, quietly, without effort or skill on the part of the driver, and does the right thing at the right time." The machine, then, must do —to the driver's complete satisfaction — what the driver now does, about shifting gears. The driver is already ably assisted, by synchromesh and other modern refinements, in manipulating the gears. The assistance is remarkable; it is splendid; but it leaves something to be desired. And naturally so—for a high degree of intelligence and skill, and a background of experience, are all required even yet to handle a car's transmission properly. The coordination needed is still involved, and takes time to learn. Further assistance might be welcomed—but that is not the answer. Instead of help to do the difficult job, the job itself must be taken over, completely. Which is simply to say, anything less than a fully automatic transmission is merely begging the question.

Mr. Booth voices a very natural objection to the idea of a fully automatic transmission when he says that if it thinks for itself, it is apt to conflict with the driver's wishes and thus interfere with his full and free control of the vehicle. This is a natural objection, and a frequent one. However, it is merely another way of expressing the doubt that any automatic mechanism could possibly do the "right thing at the right time." True enough, if it does the wrong thing, or if it does anything whatever at the wrong time, it is worse than useless. But the conclusion by no means follows from that, that if a driver loses direct control of the gears in his car he is interfered with and his pleasures spoiled. In earlier days, it never interfered with the driver of a Stanley Steamer that he had no gears to shift.

How, then, can any transmission so conduct itself as to satisfy the driver in every way, under all circumstances? To one unfamiliar with the subject, this looks like a difficult question indeed; and, as Mr. Heldt points out, there are plenty of wrong answers. No transmission can live by speed alone; nor, indeed, by torque alone. It must have a broader outlook. Its range of intelligence must take into account all that the engine does. Which comes down to exactly two things—engine speed, and engine torque output. Putting it the other way around, the transmission must keep the engine always working in its proper and effective range. If it runs too fast, under light load, it should obviously be shifted to a higher gear; or if overloaded at slow speeds, it must be shifted to a lower gear. And that is the story. Or, rather, that is the guiding principle. The answers based on it proceed to various solutions. Climbing hills, idling in traffic, quick rushes to get around another car, fast acceleration, gentle acceleration—all are correctly met by a transmission which acts according to the engine speed and load. Mr. Heldt dismisses this basis of control as too complicated; but actually the complication proves not to be so great after all. It should be added that, in common with other guiding principles, there are times when the speed-load basis of control should not be too flexibly adhered to. Experience has taught, for instance, that when the driver has slackened up for some temporary obstacle—as perhaps a traffic light that is on the point of turning—and then wants to resume speed at once, the transmission should bring itself down to a lower gear ahead of time, without waiting to feel the load of a sudden demand for acceleration in high. This is arranged so that the driver accomplishes it, by a superimposed driver control element, without realizing that he does so; in somewhat the same fashion that he is tricked into operating a conventional vacuum clutch without realizing it.

Simplicity—Compactness Necessary

How would the speed-load principle be embodied in a transmission? Obviously, by power-operated shifting mechanism, controlled to effect changes in ratio according to engine performance. The variation in ratio might be some continuously variable type; or could derive from hydraulic or electric reduction. However, practical considerations of simplicity, compactness and ruggedness seem to eliminate these possibilities and point to a more or less conventional arrangement of gear trains. Not, however, to operate by shifting entirely in and out of mesh. Any such system would mean the operation of a master clutch, as well as appropriate throttling of the engine, which sort of scheme needs only to be mentioned to be eliminated. The gears should remain in driving relation, and take up the load at appropriate times by means of clutches — the manipulation of which clutches is really what the "shifting" mechanism does. The control is based on the combined action, or interaction, of a speed-responsive governor—hydraulic pump or centrifugal weights

—and a spring which yields under engine torque to register the actual pull exerted. The spring may also be used as a cushion to absorb the impacts due to shifting to a higher gear. The simplest form of drive, and one which has proven surprisingly sturdy and efficient, consists of shallow jaw clutches, engaged or opened by a relatively short axial movement under the influence of positively actuated cams for releasing, and appropriately controlled springs for engaging. The best number of speeds seems to be four: low, of the same ratio as in conventional boxes; high, a direct drive from clutch to primary shaft; with second and third speeds selected to give geometric progression. The reverse train is handled in quite conventional manner, the driver having a lever with "forward," "neutral" and "reverse" positions. Neutral setting of the lever causes disengagement of all driving clutches in the transmission, reverse slides in a reversing idler in an appropriate train, and forward setting permits the engagement of the low-speed driving clutch, together with cutting-in of the automatic control system, which then takes charge until the driver again puts the lever into neutral position. He starts, then, in the conventional way: release of the clutch with left foot, movement of the lever from neutral to forward, and engagement of the clutch to take up the drive. Once the clutch is engaged and the car under way, the driver pays no further attention to the transmission or the clutch, unless he wishes to declutch for a temporary stop, or to return to neutral.

All of which, it may be said, might work out beautifully on paper or in charts—but how goes it on the road? Actual experience with various experimental models has been most illuminating. This experience has extended over several years, and the models have been progressively nearer the goal defined in Mr. Oldfield's letter; or, in other words, less and less thickly infested by the "bugs" and defects mentioned by Mr. Gazzeghin. He refers, among other things, to "hunting"—I wonder if he realizes what a pest that particular thing can be, and due to how many different and unrelated mechanical troubles? Now that it has been eliminated, his mention of it can be read with a smile. Anyhow, a half-hour's ride at the wheel of a car with a fully automatic, speed-load type of transmission serves as a complete answer to all doubts or criticisms based on the idea that a driver will hate to give up his control of the car, or that the transmission's behavior may interfere with his own ideas. For rapid acceleration, the driver steps on the gas and the transmission holds to the intermediate gears so as to get the best the engine can do. High gear is not then reached till the car is going 30 to 35. As there is no pause when making a shift, no interruption of torque delivered to the wheels, the pick-up is surprising, especially to the drivers of other cars. For a gradual start, when the idea is to ease gently into high and loaf away, it reaches direct at from 10 to 15 m.p.h., depending on how gentle the start. (Of course, starting on an up or down-grade will modify the results accordingly.) In traffic, it serves remarkably to release the driver's attention from his own car, and leave him free to cope with the puzzle of what the other fellow may be going to do next. When it comes to climbing a hill, I only wish Mr. Booth may some day soon have the chance to experience the sensation of doing just what he says should never be done: come to a hill too steep for high gear, give her the gas and let her go, and wait till the transmission drops back from high to third—at obviously the right moment, before the engine has begun to labor and yet not until it has had a chance to try conclusions; and go on up the hill with no pause whatever, no slackening even for an instant when the shift is made. I think he would readily pardon the designer who has thus "outwitted" the driver, and would see that when the shift occurs at the right time, no driver will think of asking for more full and complete control than he has thus given him.

RUSSELL W. TODD.

They Are Moving Tail First

Editor, AUTOMOTIVE INDUSTRIES:

Please accept my hearty congratulations on your able presentation, in the June 23 issue of *Automotive Industries*, of the work done at the Summer Meeting of the Society of Automotive Engineers at Saranac Lake.

In view of the litigation now proceeding under the Jaray patent, will you permit me to comment on page 810 of the June 30 issue?

As Herbert Chase well said, the full streamline (i.e., Zeppelin) form produces an unstable vehicle. This is the very problem solved by Jaray's streamline forms for earthbound bodies. Many disastrous attempts to speed up experimental Zeppelin and other improperly designed vehicles, some resulting in loss of life, have been made.

Had Stout's Pullman car been speeded up, as at first built, there might have been a tragedy. Fortunately Mr. Stout, with his great ability, on trying out the car, recognized this and, by attaching skirts, at least partially "Jarayized" his railcar before speeding it up.

William B. Stout is quoted as stating that the Jaray-form vehicle under the influence of a quartering wind has several times the tendency of a flat-sided car to go in the ditch. This I most emphatically deny. Twelve years' use of Jaray cars on the roads in Switzerland have proved the contrary to be the fact. Mr. Stout must be thinking of the Zeppelin form with which he is so familiar. The remark, "Nobody knows anything about it," ascribed to Mr. Chase, was, I am assured, made by Mr. Stout instead, which reminds me of Priscilla and John Alden.

As I look down from my window on the avenue I see many beautifully streamlined bodies like a fish in a stream — BUT THEY ARE MOVING TAIL FIRST! They require an absurd excess of power for speed and acceleration. Going backward as they do they are no better from the air-drag viewpoint than the 1922 boilers with cabs like locomotives—in fact not far ahead of the 1903 horseless carriages.

The industry will soon about-face and speed ahead to unexampled prosperity.

H. B. CHALMERS,
Technical Director,
Jaray Streamline Corp. of America.

New Australian Car

According to U. S. Trade Commissioner H. E. Stebbins of London, the Marks Motor Construction Company of Australia had started production of motor vehicles which was to be placed on the market in June. The name of the car will be the Southern Cross and Sir Charles Kingsford Smith will be a director of the company. The sedan model will retail at £290 (about $1,500 at current rates of exchange).

Sound Measurement and Its

E. J. Abbott
University of Michigan

THE practical problem of sound measurement is not, "Can sound be measured?" but rather, "What characteristic or characteristics of the sound shall be measured in order to yield the desired information?" Fortunately, there is one easily measured characteristic of sound which is sufficient for most practical problems, although obviously measurements of this one quantity are not sufficient completely to describe the complicated physical picture outlined above. This valuable characteristic is the sound pressure.

A sound wave causes the atmospheric pressure at any point to fluctuate about its normal barometric value. These fluctuations in pressure are ordinarily measured by means of a microphone, which is in reality a delicate pressure gage. A common type of microphone is the condenser microphone, in which the changes of pressure vibrate a very thin diaphragm, which movement changes the electrical capacity between the diaphragm and a nearby plate, and this change of electrical capacity is used to generate a voltage; the voltage is amplified by a vacuum-tube amplifier until sufficient power is obtained to operate a suitable indicating or recording device, which can be arranged to read sound pressures directly in lb. per sq. in.

If the output terminals of the soundmeter are connected to an oscillograph, the variation of sound pressure with time can be recorded on a film. These variations are exceedingly complex, and such records are not used in the study of noise problems.

If instead of being connected to an oscillograph, the terminals of the soundmeter are connected to a rectifier and a D.C. meter, the meter will give a steady reading as long as the amplitude of the sound is constant, and the reading will vary with the amplitude. A meter of the type referred to does not measure the actual mean value of a fluctuating current, but the square root of the mean square values, and if the electric meter is connected to the sound meter it indicates what is known as the root-mean-square sound pressure.

Sound pressure can be expressed in lb. per sq. in., but this is not a convenient unit, because the audible range of sound pressures at 1000 cycles per second is from about 0.000,000,003 to about 0.003 lb. per sq. in. Accordingly, the unit usually used is the dyne per sq. cm. (or bar), which is very nearly a one-millionth part of the normal atmospheric pressure. Expressed in bars, the audible range of sound pressure at 1000 cycles per second is from 0.0002 to 200 bars.

Since sound pressures are expressed in r.m.s. values, two or more sound pressures of different frequencies add by taking the square root of the sums of the squares. For instance, two pressures of 10 bars each when combined are equal to 14.1 bars. If the pressures are of the same frequency they must be added with respect to phase, the same as all other vector quantities. If a number of sound pressures of the same frequency and random phases are added, the most probable value is also the square root of the sum of the squares.

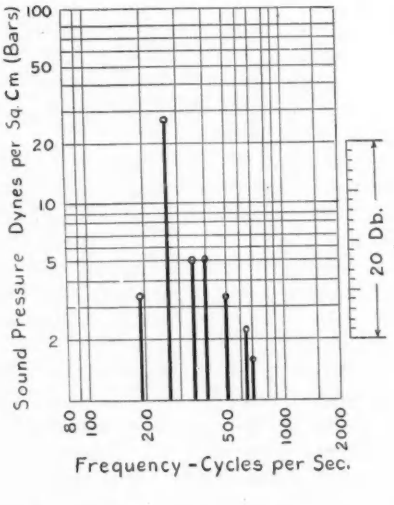


Fig. 1—Sound-pressure analysis in terms of bars (dynes per sq. cm.)

Owing to the fact that the range of the sound pressures covered by the ear is more than a million to one, it is inconvenient to plot such data to ordinary linear scales. The difficulty could be alleviated by using logarithmic plotting paper, but graphs on such paper are awkward to plot and awkward to read. For this reason it has become common practice to use a logarithmic unit, so that ordinary linear plotting paper can be used. This logarithmic unit is known as the decibel. As shown in Fig. 1, which represents a frequency analysis of a certain set of gears plotted on a logarithmic scale, the decibel is obtained by dividing one logarithmic cycle (or factor of ten) into twenty equal parts, each of which represents a decibel. In Fig. 2 the same frequency analysis is plotted in decibel units, and this brings out an incidental advantage of this unit. From Fig. 1 it might be inferred that a tremendous reduction in noise would be effected if the 260 cycle note were eliminated. As a matter of fact, if this note were eliminated entirely there would still be half a dozen notes of levels 80 to 90 db., and the general pressure level would be reduced only from 102 to 93 db.

When sound pressures are expressed in a decibel scale, the result is called the sound pressure level. To relate the decibel scale with definite physical units, a reference level is required, and this has been chosen as 0.0002 bars, which is about the faintest 1000-cycle sound pressure the average human ear can detect. The relation between sound pressure and sound-pressure level is expressed by the equation

$$\text{Sound-pressure level (db)} = 20 \log_{10} \frac{P}{0.0002}$$

where P is the sound pressure in bars. Some typical values obtained by inserting values in this equation are given in the table below.

Sound Pressure (Bars)	Sound Pressure Level (Decibels)
0.0002	0
0.002	20
0.02	40
0.2	60
2	80
20	100

In making comparisons in terms of the decibel scale, one should always

Use in Quieting Automobiles*

think of differences and never of ratios. For example, when comparing a 40 db. with a 60 db. sound, one should not think of the first as two-thirds that of the last but of the first as 20 db. less

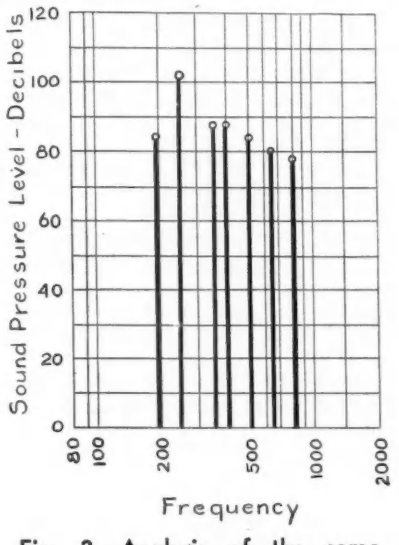


Fig. 2—Analysis of the same sound as in Fig. 1, in terms of decibels

than the second. This follows directly from the definition of the decibel scale, which is obtained by dividing a factor of 10 into 20 equal parts, so that a decibel represents a pressure ratio of $\sqrt[20]{10} = 1.12$. In other words, if two sound levels differ by a decibel, their sound pressures are in the ratio of 1.12.

If two sounds of equal pressure level are added, the sum is 3 db. greater than one of them, no matter what the initial levels may be. Thus one decibel plus one decibel is equal to 4 decibels, and 100 plus 100 decibels is equal to 103 decibels. The addition of any two sound levels can never give a result more than 3 db. above the larger of the two, and additions and subtractions are conveniently made by means of the chart Fig. 3. The need for a reference level arises from the fact that the decibel scale involves only pressure ratios, so that if the scale is to be referred to a scale of absolute units, some reference level must be used. What this reference level is has no effect on the results, but 0.0002 bars is the generally accepted reference level.

Sounds vary in quality as well as in loudness. Differences in quality are due to differences in the various component frequencies, and from the physical standpoint the quality can be specified in terms of the pressure levels and frequencies of the various components.

In practice nearly all sounds are complex, consisting of a combination of component notes of various frequencies and levels, together with more or less unpitched sound which has no particular frequency. Bumps, rattles, scrapes, etc., are examples of complex sounds which contain a large amount of unpitched sound.

There are three kinds of sound-pressure measurement of complex sounds which have been found to be of value for interpretation in terms of ear sensations. These are frequency analyses, band analyses, and weighted sound-pressure level determinations.

A frequency analysis is made by means of a frequency analyzer, which consists of a special circuit used in conjunction with an ordinary sound-pressure meter. It is provided with a tuning dial so that the instrument can be tuned to one audio frequency after another and the sound pressure of each frequency determined. While in some instruments the tuning is varied continuously over the frequency range and the resulting curve is plotted automatically, in automotive noise investigation it is more convenient to use a manually-tuned, portable instrument. The unpitched sound, which cannot be measured by the ordinary frequency analysis, can be determined either by subtracting the combined sound pressure of the pitched sound from the total sound pressure, or it can be measured in regions between notes by the use of an analyzer which has a narrow, adjustable band pass circuit.

If the frequency response of a sound-pressure meter is arranged to give a predetermined weight to each component of a complex sound, before the components are added in the rectifier circuit, the result is not the actual sound pressure in bars but a weighted sum expressed in decibels. This represents the sound-pressure level of the 1000-cycle note which gives the same meter reading. In other words, 1000 cycles is given a weight of unity and other frequencies are weighted according to the selected curve.

Practically all sound meters or noise meters now on the market measure weighted sound-pressure level, each having its particular weighting due to its frequency-response characteristic. Some meters have more than one, the alternate characteristic being made effective by throwing a switch. While the term "weighted sound pressure level" is not usually used in connection with these meters, that is the correct physical designation.

In an investigation of complex tones, the measurements may consist of frequency analyses, band analyses, or weighted sound pressure-level determinations, or all three, depending on what interpretation is planned in terms of ear sensation.

IN the second part of the paper, entitled "Interpretation of Sound Measurements in Terms of Ear Sensations," the author dealt principally with tests made to determine whether measurements with the soundmeter give the same relative rating of various noises as ratings by ear, using a considerable number of observers. A table was given

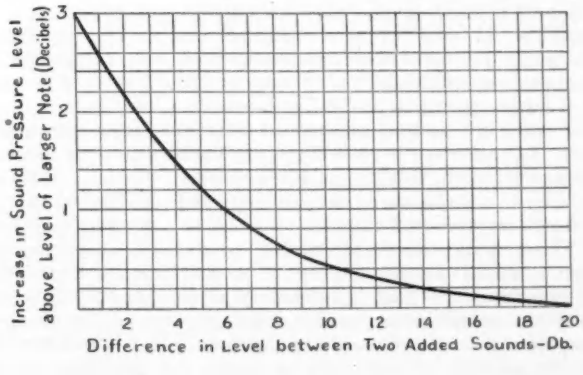


Fig. 3—Curves for adding sound-pressure levels

*Digest of paper presented at the S.A.E. Summer Meeting by E. J. Abbott, University of Michigan.

which showed comparison between the meter readings and the loudness level as obtained by two different "sound juries" of ten observers each, and also the range of values obtained by the observers on each sound. The average discrepancy between the meter readings and the combined judgment of the observers was 2.5 db., while the maximum discrepancy was only 4.4 db.; this, the author pointed out, is considerably less than the average accuracy with which the single observer could repeat balances on different days. In view of the large spread of the individual observations, and the differences between the averages of the two groups of ten, the check between the meter readings and the observations was well within the accuracy of the average ear ratings. The author said he felt this was a very severe test, and that the meter measurements were completely confirmed.

A PROBLEM of noise reduction with the aid of soundmeters generally is dealt with as follows: First the sound is measured to determine the various components and the parts causing them. From this it is definitely known just how much the noise of each part must be reduced in order to obtain a given over-all reduction, and also which components of the various sounds are loudest. The next step consists in testing out various quieting means on the individual parts, in order to determine the most economical method of obtaining the necessary reduction on each part. Following this the whole assembly is tested to make sure that the expected reductions are realized.

The popular assumption that to obtain a relative noise rating of a pair of machines, all that is necessary is to take a soundmeter reading at corresponding locations near the machines, is completely wrong. As a rule, a single reading taken at any point near a machine is entirely valueless as a noise rating for that machine. This is due not to a peculiarity of the soundmeter but to the characteristics of sound itself.

If a soundmeter is used to measure a steady sound, such as that of a loud speaker operated by a constant-voltage generator, a steady reading is obtained; but when a soundmeter is used to measure machinery noises the reading usually is not steady; on the contrary, the pointer of the indicator dances around in an erratic fashion, showing that the sound level is not constant. Sometimes these changes in level are important and must be measured. For example, to measure the increase of noise when a car passes by, when a door is slammed, or when a gear produces periodic sounds due to being out of round, use must be made of a meter capable of following these rapid changes in level. Such changes can be recorded automatically.

If, on the other hand, it is desired to obtain a rating of the tire noise in a car at a given speed, an average value is most useful. In that case it is convenient to measure the output of the soundmeter with an instrument with considerable inertia in the moving system, so that short-time variations are automatically averaged.

One of the worst sources of trouble in connection with noise measurement lies in the phenomenon referred to as wave pattern. If any particular machine is run at constant speed and load, and the microphone or soundmeter is held near it, say 6 in. away, and then moved around over an area of several sq. ft., the readings from point to point vary tremendously, even though the distance from the machine is kept constant. Measurements of total noise usually show point-to-point variations of the order of 10 db.; measurements of individual notes, 20 db.

The explanation of this phenomenon is quite simple. In order to radiate sound, a machine must vibrate at frequencies within the audible range (20-20,000 cycles per second). Most machinery noises lie between 100 and 1000 cycles per second. At these frequencies machine parts do not vibrate as a whole, but break up into many vibrating segments, each of which sends out a train of sound waves. These waves from the various vibrating segments of the machine spread in all directions, and cross and recross waves from other segments of the machine, and also waves reflected by nearby objects. In certain places the waves add, giving a high level of sound, while a few inches away they may subtract, giving a low level.

The wave pattern around a given machine, which is constant under constant conditions of operation, may be completely shifted by a slight change in operating speed, or, if reflected sound is appreciable, by merely changing the location of some object in the neighborhood. Consequently, a single reading at a point near the machine is quite meaningless as a noise rating.

Fig. 4 shows measurements made on a car of four different notes originating from the rear-axle gears. The microphone was placed about 6 in. ahead of the rear axle, measurements were taken at different speeds, and the results were recorded in terms of loudness level. The level increased between 20 and 30 db. as the speed was increased from 15 to 40 m.p.h., but the increase in the notes was not uniform.

A single set of data such as these do not show whether the peaks in the curves are important or not. If they are due to resonance they are important, because in that case they can probably be eliminated. If they are due to wave pattern, they are not important, because a slight change in the position of the microphone would shift the locations of the peaks to other frequencies. This necessitates taking readings at nearby points, so that wave patterns can be averaged out.

Fig. 5 shows data taken in the same car on one of the notes from the rear-axle gears. Speed was held constant, and the microphone was moved around in order to locate points of maximum and minimum level of the particular note. The loudness level is inscribed on the plan of the car at the point where it was observed, and the figure below it indicates the height in inches above the floor where the measurement was made. All maximum and minimum points were measured, the maximum being the largest reading in a given region and the minimum the smallest. Maximum readings are enclosed in squares, minimum in circles. Determinations were made also of the locations of the locations of maxima and minima for this same note at different speeds, and for other notes at the same speed, and the patterns obtained bore no relation to the one shown.

One method of eliminating the effect of wave patterns consists in placing the machine whose noise is to be studied

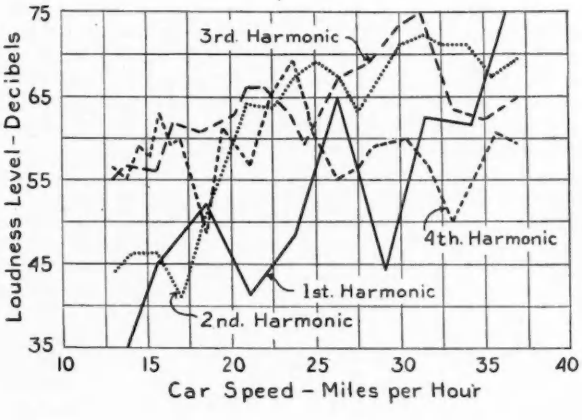


Fig. 4—Analysis of rear-axle-gear noise (microphone located 6 in. in front of axle)

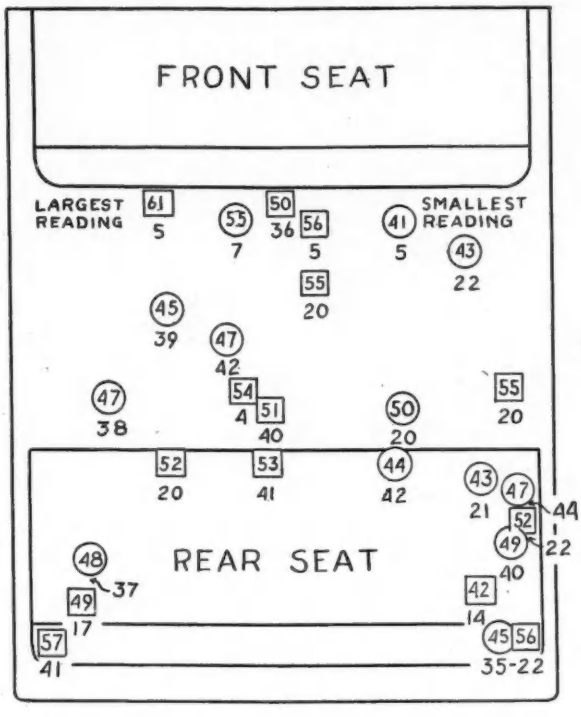


Fig. 5—Noise distribution in car

in a sound chamber with hard reflecting walls, in which there is a large sheet-iron reflector that is rotated continuously to shift the wave pattern and to move the microphone. By then using a meter of slow response, to average out the changes caused by these movements, very good averages are obtained quickly.

Usually the noise rating under a single set of conditions is not sufficient and it is desirable to know the effects of changes in speed, load, running-in and other factors. In one particular case it was desired to know what effect an adjustment would have on the noise of a set of gears. Preliminary tests had shown that there were at least two important component notes and that they were affected differently by changes in adjustment. It was also found that the effect of a given adjustment, such as axial movement of the pinion, depended on the other adjustment.

Quieting moves can be classified under the following heads:

1. Mismatching of vibrational impedances.
2. Reduction of radiation resistances.
3. Enclosure.
4. Accoustical absorption.
5. Introduction of mechanical damping resistance.
6. Greater accuracy of parts.
7. Shifting of frequencies to less audible ranges.

All of these methods are of practical value and the investigator should use them impartially.

Experience indicates that mismatching of vibrational impedance is by far the most generally applicable means of effective and economical quieting of machinery. A familiar example is the so-called harmonic balancer for crankshafts. Technically, this represents a mechanical short circuit on the torsional vibro-motive forces generated in the crankshaft, and this short circuit keeps the vibrations from being transmitted to the remainder of the car. Another familiar example of mismatching is the exhaust muffler. This offers comparatively small impedance to low frequencies, thus letting the exhaust gases pass through rather freely, but offers a high resistance to audio frequencies. Familiar instances of quieting could be multiplied almost without number, yet the possibilities of this method have hardly been scratched.

The sound which reaches the ears of an observer in a car must be radiated from some vibrating object or objects, and usually these objects include a whole series of parts which are connected to the original source through metallic or other more or less solid connections. Ordinarily, the sound radiated from these secondary sources is many times that which is radiated near the source. (The fenders of the old Model T used to do a lot of rattling, but they were not the source of the vibration). Now, the amount of sound radiated from a body depends upon how it vibrates, and its shape and dimensions. In general, larger surfaces radiate better than smaller ones for a given amplitude of vibro-motive force, particularly for the lower frequencies. The technical name for this characteristic is radiation resistance, and the amount of sound emitted by a part can be varied greatly by suitable design.

If a sound-proof box can be placed around either the source of sound or the observer, the noise reaching the observer is greatly reduced. If this box can be supported so as to be free of mechanical vibration, the amount of shielding is surprisingly large. It is a pretty poor partition that will not give a 20 or 30 db. reduction for transmitted air sound. The practical difficulties arise in making enclosures; the first is the difficulty of isolating the partition from mechanical vibration, and the second is resonance of the wall surface at particular frequencies. If these are properly avoided, a large reduction can be obtained with a comparatively inexpensive enclosure; otherwise the enclosure may actually increase the noise.

Ordinarily there is little or no point in making an enclosure of so-called "sound deadening" or "sound absorbing" material. The important property of the enclosure is low transmission of sound, and deadening materials are usually not outstanding in this respect.

In certain cases noises can be effectively reduced by the use of sound-absorbing material. Familiar examples are the "straight-through" muffler, in which sound-absorbing material is placed around a central tube, and the acoustic treatment of offices, auditoriums, etc. Effective reduction is obtained, provided the material is so placed that the sound is absorbed before it reaches the observer's ears. Unfortunately, most absorbant materials are not very effective at low frequencies, for which they are most needed, although materials with special characteristics have been developed for individual applications. They also have disadvantages from the standpoints of permanence, appearance, and ability to withstand cleaning.

One of the three factors of vibrational impedance is resistance, the other two being mass and compliance. Resistance is the least important, except in cases of transients and at resonance. An example of the latter is the tinny sound when a car door is slammed, which can be reduced by the well-known method of adding mechanical resistance in the form of viscous material applied to the metal panel.

Noise caused by obviously sloppy production can be effectively reduced by more careful workmanship; but if an effort has been made to hold work within the close limits commonly used in modern automotive production, the decrease in noise obtained by an overall tightening up of limits is liable to be entirely incommensurate with the effort and cost required; indeed it quite often happens that the extra-special jobs are noisier than the ordinary run of production. This is because audio vibrations ordinarily involve dimensions conveniently measured in mil-

lionths of an inch, while production tolerances are seldom closer than tenths of thousandths.

The human ear is less sensitive to sounds of lower frequency than to those in the neighborhood of 1000 to 2000 cycles, particularly in the case of faint sounds, consequently, it is sometimes possible to make reduction by so modifying the design of the machine that notes with lower frequencies will be produced.

From the foregoing it is apparent that as a rule the question is not "Can the noise be reduced?" but rather "What is the simplest and most economical method of obtaining the desired reduction?" Once the necessary measurements on the relative importance of the various noises and on the effectiveness of different quieting means have been made, the problem is reduced to selecting the most economical method of obtaining the desired reduction.

IN the discussion of Dr. Abbott's paper, Ferdinand Jehle, after having congratulated the Society upon having secured such an informative paper on the subject, asked the author whether the apparatus described by him was within the scope of application by the average automobile engineer. Dr. Abbott answered by asking Mr. Jehle whether he would entrust a metallurgical microscope to the average mechanical engineer. Such work, he said, should be left to specialists. As regards the cost of the apparatus, he thought that an appropriation of a couple of thousand dollars would be required, but a representative of an acoustical organization present thought his estimate was too low and mentioned that a group of five engineers engaged in this work had at its disposal apparatus costing $90,000.

J. H. Hunt thought that this field offered new opportunities for the consulting engineer. Specialization was required, of course, but specialization in noise abatement might well be combined with that in the field of vibration or balancing.

Mr. Stanton said a good many industrial noises constituted practically continuous sound spectra. He further said that a noise is completely defined by three characteristics, viz., the frequency of its components, the intensity of these components, and the time each component persists.

Earl Gunn said he had found that the difficult problem was not to determine the frequency and intensity of various components of the noise, but what to do after these determinations had been made. In answer to a question he said that the so-called road noise due to a passing car was largely tire and air noise. This had been proven by shutting off the ignition while a car was passing, which made practically no difference in the volume of noise.

Automotive Oddities—By Pete Keenan

J.A. ODLE TOTALLY BLIND SINCE BIRTH OPERATES A SUCCESSFUL SERVICE STATION. Corinth Miss.
A SIGN IN ILLINOIS. U.S. Route 27.
RUSHVILLE
HAVANA
CUBA
HOT WATER KEEPS A MOTOR COOL-WHILE ICE WILL BURN IT UP.
JACK PINE TROPHY
THE NATIONAL MOTORCYCLE ENDURANCE TROPHY IS AN OLD COW BELL.
ELEPHANTS IN CEYLON ARE COMPELLED TO WEAR HEAD AND TAIL LIGHTS.

Looking down the chassis assembly line at the Federal Motor Truck plant

PRODUCTION LINES

Needs Change

Stock car racing out on the Coast this year brought out some weak spots in the steering mechanism that can be readily remedied. And should be if high-speed driving is encouraged. One light car stopped to replace the left steering spindle three times during the 250-mile run and finally went out with a broken right spindle. The same car suffered a broken steering arm three times in a row. Several other cars of different make were forced to replace steering spindles. Another chronic trouble which worries the race drivers is lack of stiffness in the tie-rod. This results either in a serious misalignment of the wheels or actual buckling of the tie-rod. One car maker has handled the problem by supplying a truck tie-rod as standard on his passenger car models. All the trouble seems to arise from the higher sustained speeds and fast cornering. And it's well worth investigating what with the present trend in road speed and cornering both.

Air Condition

From the Department of Commerce comes the first collection of the voluminous material available on air conditioning. The bulletin is titled, "Bibliography of Information on Air Conditioning." Among its features are: a list of trade associations and technical societies interested in the subject, reference to articles in trade publications, foreign magazine references, government reports, etc. We are told that early requests for copies of this bulletin can be filled from the Bureau's supply.

Radio Guide

Hygrade Sylvania has done a good turn for those who have anything to do with automobile radio. We recommend their booklet, "Auto-Radio Installation and Servicing." It gives some brief but interesting notes on installations, antenna and ground practice, service hints, etc. Just the kind of information that's wanted by engineers and trouble shooters.

Good Wind

Airflow body styling as well as the swanky fenders have given the press maker a new deal. As you get around there is hardly a plant that doesn't have at least one new press and some have batteries of them. All because the old stand-bys have neither the bed capacity nor the power to handle the big sheets.

Keeps Spreading

External broaching, we find in getting around Detroit, is fast encroaching on the preserves of the large milling machines. The next development is said to be the broaching of cylinder heads and all the wide surfaces of cylinder blocks. This has been done experimentally for many moons and is sure to blossom out as a full-fledged manufacturing process before long.

Day Rate

Complete reversal of wage incentives has taken place in one of the large car plants in Detroit. Making a sudden change in the direction of present day thinking, this company has placed all productive operations on day rate, with surprising results. First of all, the workmen are happy —it's the very thing they've been fighting for since the new deal. The result is better cooperation and a positive increase in productivity per man. We got this from the works manager of another organization, so the news is not likely to be colored.

New Alibi

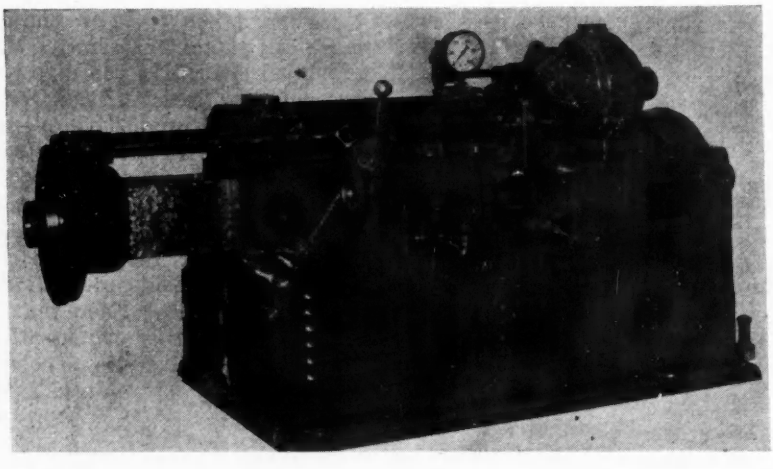
Needless to say, many, many plants are sadly lacking in modern production equipment. Some haven't bought a machine in three or four years or more, and we know that many startling changes have taken place in that flight of time. Some choose to be complacent about their situation, others have found a good(?) alibi. Have you heard them say that they aren't modernizing because cost-reducing equipment will displace labor? Surely a strange philosophy for an industry that has everlastingly increased employment and consumption of its products through improved methods and by dint of cutting the price to the consumer.—J. G.

MANUFACTURING MANAGEMENT METALLURGY

NEW DEVELOPMENTS
Automotive Parts, Accessories and Production Tools

Square Ram Hydro-Drill

W. F. & John Barnes Co., Rockford, Ill., has just brought out the square ram hydraulic drill unit which is a compact, self-contained machine-tool unit for drilling, boring, reaming, milling, and similar metal working operations. It comprises a base in which is mounted



a standard electric motor and a square ram having a 12 in. stroke. Mounted in ball-bearings in the square ram, is a spindle which is driven by the electric motor through pick-off gears. A socket is provided in the spindle-nose for driving a single cutting tool or a multiple-spindle head bolted to the integral flange on the end of the ram.

A distinctive feature of the unit is the square ram which provides adequate support without permitting twist or turn. The Barnes patented high pressure feed pump is said to maintain a constant ratio of feed per revolution regardless of resistance at the edge of the tool. Feed rates are infinitely variable within the range given in the specifications. Another Barnes pump supplies oil at lower pressure and in larger volume for the rapid traverses of the automatic operating cycle.

Barnes hydraulic drill units can be operated in any desired position or at any angle. They can be mounted on existing machines in many instances and, of course, easily incorporated in new designs. A number of these units can be operated in combination; with independent or centralized control.

Maximum stroke of unit is 12 in. Spindle speeds through pick-off gears; with 1200 r.p.m. motor—92 to 750 r.p.m.; with 1800 r.p.m. motor—138 to 750 r.p.m.

"Cutanit" a New Tool Alloy

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Cutanit is ground on silicon-carbide wheels with a soft binder. For rough grinding—medium coarse grained wheel; for finish grinding—fine-grained wheel. Slightly worn cutting edges may be ground directly on the finishing wheel.

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About 10 ounces of Loxal powder and three ounces of Loxal solvent per gallon of water are dissolved in an iron tank. The parts to be treated are introduced into this solution in perforated iron baskets, on racks or by conveyors or trays, and are held in this solution for a period of from one to five minutes and are then given a quick rinse in hot water, after which they are dried in open air or a warm air blast.

Little preparation is needed before treatment. Removing oil or grease and sometimes a brief pickling treatment, followed by rinsing in hot water, usually suffices.

Equipment is inexpensive and said to require practically no maintenance. A metal tank of requisite size, fitted with steam coils to heat the solution to 150 deg. F. and with facilities for filling with water and for handling the material to be treated, is all that is necessary.

Loxal coating also acts as a bonding coat, presenting a uniform surface free from blemishes, to which the finishing coat of paint, lacquer or enamel is said to adhere tenaciously. Should any part of the base metal become exposed through a scratch or a break, the coating is said to inhibit the spread of rust.

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Grinds Airplane Parts and Similar Work

The Heald Machine Company, Worcester, Mass., has just brought out an internal grinder arranged with a hollow type workhead for grinding single airplane cylinders, long sleeves and work of similar nature. This machine is known as the Style No. 73 Airplane Cylinder Grinding Machine.

Since an airplane cylinder is bolted to the engine by the flange and centralized by the turned diameter of the skirt, the fixture was designed to locate from these surfaces so that the bore would be ground at right angles to the flange and concentric with the outside diameter of the skirt.

In chucking the cylinder, an adapter ring is first bolted to the flange, then a bracket with a stud is fastened to the rear. The cylinder is then loaded into the workhead from the left hand end, centralized by six locating pins. Guide bars guide it into position. The adapter ring is then clamped against three positive stops by hook clamped bolts operated from the front and which lock the cylinder into the workhead so that the bore is concentric with the center line of the workhead and square with the flange.

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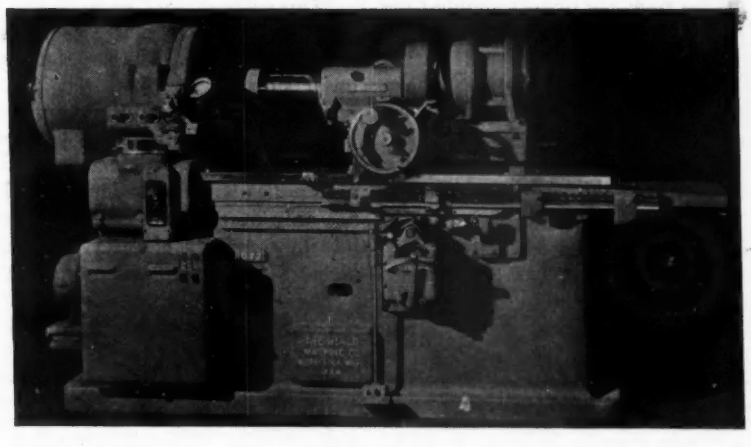

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Total floor space required is 126¼ in. x 76½ in.; hole in spindle, 10 in.; table speeds, 0 to 44 ft. per min.; net weight, 10,000 lb.

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One of its outstanding features is the nozzle head which is said to operate on a new principle. It produces a highly atomized spray which at the same time procedes at a reduced forward speed to the extent that a portion of the usual spray mist is said to be eliminated. An advantage of the slower speed spray is that material already applied but still wet is not rippled. This is said to eliminate all orange peel effects.

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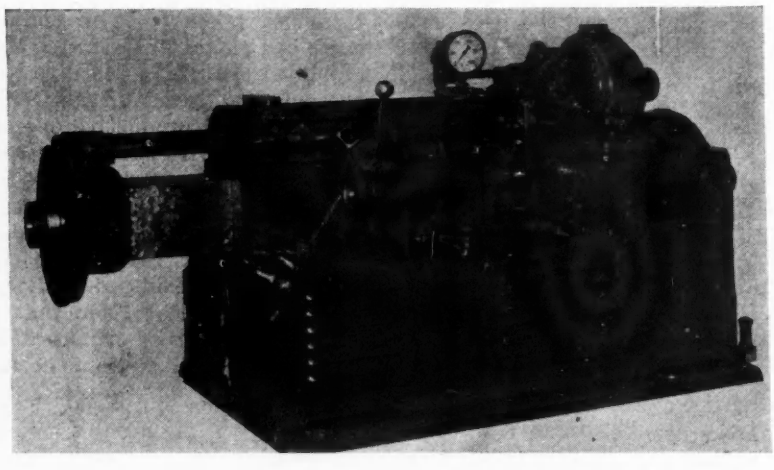

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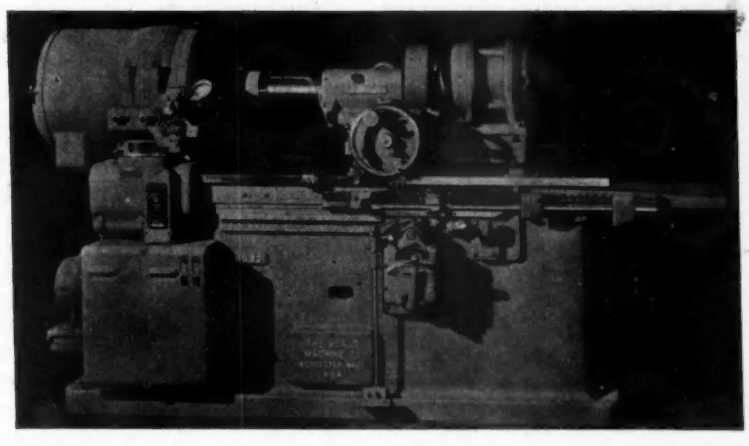

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Spray Gun Big Producer

H. D. B. Corp., Chicago, Ill., has brought out a new spray gun, No. 5, which is said to produce considerable saving in material and eliminate much of the sanding expense because of the smooth finish.

One of its outstanding features is the nozzle head which is said to operate on a new principle. It produces a highly atomized spray which at the same time procedes at a reduced forward speed to the extent that a portion of the usual spray mist is said to be eliminated. An advantage of the slower speed spray is that material already applied but still wet is not rippled. This is said to eliminate all orange peel effects.

Unemployment Insurance Enactment By Congress Certain, Elbert Predicts

WASHINGTON — The certainty of passage of some form of unemployment insurance legislation by the next Congress has been forecast by Col. Robert G. Elbert, a member of the Unemployment Insurance Committee of President Roosevelt's Industrial Advisory Board. This committee has placed before the board a plan recommending contributions by employers and employees, but not by federal, state, county or city governments. The whole scale of social legislation has been gaining ground rapidly in recent months, and particularly this phase of it since Wisconsin's compulsory law became effective July 1. Less than a fortnight ago Walter C. Teagle, Standard Oil of New Jersey, president, urged voluntary unemployment insurance instituted by industry itself and reinforced by state and federal legislation. (*Automotive Industries*, July 7, June 23 and 30.)

Discussing the recommendations of his committee, Colonel Elbert stated his belief that had the United States adopted some form of unemployment insurance in 1920, the time the British adopted the plan, the severity of the depression from which this country has suffered during the last five years, would have been greatly mitigated. Seven principal provisions are contained in the plan developed by the insurance committee for consideration of the Advisory Board. They are:

In any well-conceived plan both the employer and the employee should contribute. The state or nation should not contribute.

It should be compulsory on all workers in insured industries up to certain wage limits.

The benefits should be paid to the unemployed as a right and not as a charity.

Benefits to an unemployed worker should be paid only for a definitely fixed number of weeks.

Funds should be pooled, including all industries and all employers and workers in the same field.

There should be a labor bureau or exchange with numerous branch offices throughout the country for the purpose of finding jobs for the unemployed and for administering the insurance system.

The government should not be required to contribute, for the reason that a large proportion of the people, farmers, for instance, will receive no benefit from the system. Furthermore, the people as a whole will necessarily pay a share of the cost through the slightly increased prices of commodities.

"Our calculations," said Colonel Elbert, "have convinced us that 4 per cent of the workers' wages will be sufficient to carry on a satisfactory plan. Of this 3 per cent to be paid by the employer and 1 per cent to be paid by the worker." No plan will be satisfactory in the end unless it is sufficiently large to take care not only of transient unemployment but to set up a body of reserves which may be used in case of serious depressions.

The plan proposed covers all workers except those employed by the government, fisheries, clerical workers, sales persons, farm laborers, domestic help (not including hotel and restaurant employees) professional groups and federal, state, county and city employees.

Colonel Elbert's committee estimates that about 22,000,000 workers with aggregate weekly wages of $440,000,000 would be covered by the insurance plan. These figures represent annual contributions of $915,200,000 by the employers and $228,000,000 by the workers, a total annual contribution of $1,144,000,000. This sum would allow approximately $52 per year benefits per worker. The average weekly contribution per worker would be about 55 cents.

Under the recommended plan adults without dependents would receive 40 per cent of their weekly wage for 26 weeks; adults with one dependent, 50 per cent; adults with two dependents, 60 per cent, and with three or more dependents 65 per cent; workers under 21 years of age, living with parents, would receive 30 per cent of their weekly wage.

Practice Recommendation

WASHINGTON — The Division of Simplified Practice of the National Bureau of Standards announces that Simplified Practice Recommendation R118-30, on abrasive grain sizes, has been reaffirmed by the standing committee of the industry, without change.

Postpone Annual Meeting

CLEVELAND — The annual meeting of the stockholders of the White Motor Truck Co. has been postponed again, for the third consecutive time. It is now reported the meeting is scheduled for Aug. 3. No reason has been assigned for this most recent postponement.

Financial Position of the Automotive Industry, 1926-33

(In Thousands of Dollars) — Per Cent

End of Year	No. of Cos.	Cash and Marketable Securities	Notes and Accounts Receivable	Inventories	Total Current Assets	Total Current Liabilities	Funded Debt	Cur. Assets ÷ Cur. Liab.	Cash to Current Assets	Receiv. to Cur. Assets	Invent. to Cur. Assets	End of Year
Automobiles												
1933	13	$290,016	$48,294	$194,392	$534,302	$118,399	$41,940	4.51	54.28	9.04	36.38	1933
1932	13	302,077	57,560	139,127	499,197	90,661	45,037	5.51	60.51	11.53	27.86	1932
1931	13	370,197	73,740	198,996	645,235	131,504	48,371	4.91	57.37	11.43	30.84	1931
1930	13	346,377	83,876	258,503	694,333	137,975	52,281	5.03	49.88	12.08	37.22	1930
1929	13	290,431	120,194	360,931	775,443	202,207	56,337	3.83	37.45	15.50	46.54	1929
1928	13	415,986	127,952	369,142	917,491	290,088	70,264	3.16	45.34	13.95	40.24	1928
1927	13	353,939	115,235	315,491	788,652	242,909	8,162	3.25	44.87	14.61	40.01	1927
1926	13	254,202	119,793	299,495	680,890	218,163	7,365	3.12	37.33	17.59	43.98	1926
Automobile Accessories												
1933	25	$29,933	$19,313	$41,123	$90,875	$18,518	$18,315	4.91	32.94	21.25	45.25	1933
1932	25	36,182	16,064	33,758	86,517	14,760	18,951	5.86	41.92	18.61	39.16	1932
1931	25	42,911	22,167	45,894	111,161	28,739	15,084	3.87	38.60	19.94	41.29	1931
1930	25	51,624	28,546	55,924	136,275	29,004	14,246	4.70	37.88	20.95	41.04	1930
1929	25	70,118	36,551	74,364	182,125	39,207	16,714	4.65	38.50	20.07	40.83	1929
1928	25	71,921	41,066	69,886	187,466	46,847	18,281	4.00	38.36	21.91	37.28	1928
1927	25	29,210	31,321	52,157	113,444	32,684	19,469	3.47	25.75	27.61	45.98	1927
1926	25	27,436	24,412	56,331	108,825	31,984	21,241	3.40	25.21	22.43	51.76	1926

From Moody's Industrials, 1934.